

FLIGHT

First Aero Weekly in the World.

Founder and Editor: STANLEY SPOONER.

A Journal devoted to the Interests, Practice, and Progress of Aerial Locomotion and Transport.

OFFICIAL ORGAN OF THE ROYAL AERO CLUB OF THE UNITED KINGDOM.

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EDITORIAL COMMENT.

The King and Aviation.

All connected with the aviation movement will have read with considerable pleasure and satisfaction the letter which the King has sent to Mrs. Busk expressing his sincere sympathy with her in the loss she has sustained in the death of her son, Mr. E. T. Busk. His Majesty has for some years taken a very keen interest in the progress that has been made in the world of aviation. In addition to several visits to the Aircraft Factory at Farnborough, a number of our aviators have at different times been invited to Windsor Castle to give demonstrations of their prowess. The new arm of the naval and military services has already more than "made good," as the Americans say, in the war; and the fact that the King, as is evidenced by the letter above mentioned, closely watches every new departure associated with aviation, should act as a further encouragement to all who are serving their country in the Royal Naval Air Service and the Royal Flying Corps.

Aircraft Invasion Scares.

It would be interesting, if it were possible, to trace the origin of the various rumours that have been current during the past week or so anent actual visits of hostile aircraft to various parts of this country. Such rumours

have reached us from, among other places, Exeter, Harwich, Sheerness and Dover, and, like the story of the Russian soldiers that passed through England in tens of thousands *en route* for the front, they have, in some cases, been corroborated by "eye-witnesses"; one, indeed, going so far as to assert that a hostile dirigible had been brought down in this country, but that the fact was being kept an official secret! Although, fortunately, such rumours have so far done nothing more than cause a momentary and local excitement amongst the general public, no good can come of this sort of canard being allowed to spread, and we should like to see a law enforced making the spreading of false news of this kind a punishable offence.

While we have always held the view that the dirigible can perform certain useful purposes in war operations, anyone who has followed the history of the Zeppelins or who has watched them manœuvring, cannot help entertaining a feeling of doubt as to their efficiency, beyond bomb-dropping, as fighting machines. Dirigibles of this much-talked-of type are unwieldy, slow to manœuvre, and require to be handled with considerable care. Moreover, their great length provides a relatively easy target for attacks, while their own offensive capacity is much more limited than the general public has been led to imagine. Indeed, if Zeppelins were the fearsome craft they are so often depicted to be, it is hardly conceivable that Paris, Ostend and Antwerp would have escaped practically unscathed—so far as war damage is concerned—from the visits of such craft. Even in Belgium, where the bases for operations were comparatively close at hand the air raids were absurdly unsuccessful.

In view of these facts, and admitting the possibility of an attempted raid on this country, it is hardly conceivable that they will meet with any greater success than they have in Belgium or France, the more so seeing that they will have to journey a greater distance from their base and also to take unpleasant chances across the sea. Up to the present the chief evidence that an invasion by air is contemplated by the enemy is the boastful assertions of German newspapers that a fleet of dirigibles, growing day by day, is on the eve of departure for London. When such assertions are compared with the feats hitherto accomplished, it does not appear that there is any serious cause for alarm.

Equally doubtful, in our opinion, are these reports of the huge additions recently made to the Zeppelin fleet.

The facts that are available all go to show that little more has been done in this direction than to make good the wastage that has taken place. Even if the number of such dirigibles has been considerably increased, the probability of a successful attack would be but little strengthened.

Writing on the subject in the *Echo de Paris*, General Cherfils, of the French Army, after pointing out that it is certain that the British authorities have taken steps to deal with any invasion, and that any attempts of the kind will not go unresisted, expresses the view that "victory will rest with the fighting instrument which is most mobile, most rapid, most invulnerable and most audacious. The Zeppelin is a delicate monster, fragile, and condemned to inability to ascend to a great height under penalty of a dangerous condensation, which may bring about a catastrophe." Although the General does not definitely say so, it is not difficult to draw a conclusion as to the arm on which, in his opinion, victory will rest in such a fight—with the aeroplane.

An American View of Large Dirigibles.

In this connection it may be worth drawing attention to a similar view to that of General Cherfils which is held by General Scriven, the Chief Signal Officer of the U.S. Army, although it does not follow that one need necessarily agree with the views expressed. In an exhaustive report on aircraft which,

according to a special correspondent of *The Times*, he has just drawn up for the U.S. Secretary for War, General Scriven remarks that he is not prepared to recommend the American Army to seriously take up the question of constructing dirigibles, as they are not worth their cost as offensive machines, while for reconnaissance or defence they are of far less value than aeroplanes. The General adds that "dirigibles are seemingly useless in defence against the aeroplane or gunfire, and their attack may be safely left to the care of fire from the ground and to the aeroplane. These Dreadnoughts of the air can be used for offence as well as defence only in such infrequent and exceptional conditions that their construction under present conditions must be pronounced undesirable. It may later be shown that aerial offensive flight, especially in conjunction with sea operations, may prove important, but it is useless to prophesy, and I believe that the only safe conclusion at this time regarding the value of aerial offensive, is a verdict of 'Not proven.'"

Although the Admiralty, through the Commissioner of Police for the Metropolis, has deemed it wise to still continue the order for the lowering of all external lighting at night, these and other widely-expressed official opinions more than confirm and justify the views expressed by us that the public have no reason to fear the dire fatalities and destruction which the Germans and their spies so persistently foretell from the Zeppelin bogey.

AIRCRAFT WORK AT THE FRONT.

THE following reference to aircraft was made in the despatch dated November 10th from an "Eyewitness" present with the British Headquarters in France and issued by the Official Press Bureau on the 16th inst. :—

"Along the rest of our line nothing of special interest occurred. Farther south our aeroplanes and those of the French scored a success by partially destroying two of the old forts of Lille. Fort Englos was blown up on the 4th, and Fort Carnot on the 5th. They were most probably used as magazines, and may have been of some tactical importance as *points d'appui* in the line of entrenchments."

In connection with the great loss sustained by the nation in the death in France last week of Lord Roberts, who it may be recalled had been a Vice-President of the Royal Aero Club since 1910, and a member of the Council since 1906, the following extract from a state-

ment issued by the Press Bureau on Monday, shows the interest which he took in the work of the Royal Flying Corps :—

"He arrived in France on Wednesday, November 11th, and motored to General Headquarters after inspecting an Indian hospital ship in port and the Royal Flying Corps on the way."

In the official account of the funeral service of Lord Roberts in France, issued by the Press Bureau on Wednesday, there was the following record of a last tribute to the great soldier paid by the Royal Flying Corps :—

"At this moment a fresh sound was heard above the roar of the artillery and the brassy music of the trumpets as a British aeroplane, one of the aerial guard that had been watching and protecting the procession, swooped up into sight, circled the square, and dipped in salute."

The Late Mr. E. T. Busk.

THE great interest which H.M. the King takes in the aircraft work of the army has again been shown by the following letter received by Mrs. Busk, the mother of the late Mr. E. T. Busk, who lost his life under the circumstances recorded in last week's *FLIGHT*, while flying over Laffans Plain :—

Buckingham Palace,
November 11th.

DEAR MRS. BUSK,—The King has heard with much concern of the tragic death of your son Mr. Busk.

His Majesty well remembers meeting him at the Royal Aircraft Factory on the occasion of their Majesties' visit to Aldershot last summer, and was much struck by his ability and technical knowledge of the machinery of aeroplanes.

The King also saw him give an exhibition of flying in a stable aeroplane of his own invention.

In offering you his sincere sympathy in your bereavement, the King feels that the country has lost the services of one who, by

experiment and research, contributed in no small measure to the science of flying.

Yours very truly,
CLIVE WIGRAM.

Mrs. Busk has been much touched by the numerous letters of sympathy which she has received. She is unable to answer these at present, and hopes that the writers will forgive her for expressing her gratitude through the Press.

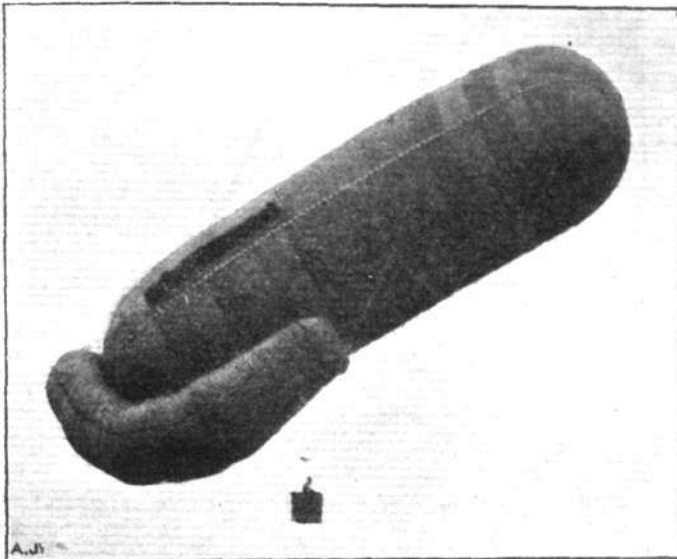
Promotion for Mr. H. E. Perrin.

THE members of the Royal Aero Club, and his many friends outside the Club, will note with gratification the official notification which is given on page 1132 that Mr. Harold E. Perrin, the popular Secretary, who obtained a Commission as Lieutenant in the Royal Naval Volunteer Reserve in September last for duty in connection with the Royal Naval Air Service, has now been promoted to the rank of Lieutenant-Commander.

THE PARSEVAL-SIGSFELD KITE BALLOON.

A TYPE of aircraft which is being used extensively by the Germans in the present war, and has caused considerable amusement among the Allies' troops on account of its rather peculiar shape, is the Parseval-Sigsfeld kite balloon. Although it is a number of years since the device was introduced, it had not attracted a great deal of interest outside of Germany. In the British Army, previous to the

wind they may be kept from rotating and oscillating as does the ordinary captive balloon. The P.-S. kite balloon consists essentially of a cylindrical gas chamber or envelope with hemispherical ends so arranged that it points into the wind and forms an angle of about 30° with the horizontal. This cylindrical envelope is divided by a horizontal partition situated near the lower end in such a manner as to form two separate compartments, of



A Parseval-Sigsfeld kite balloon in the air.

introduction of the aeroplane, aerial reconnaissance was largely confined to that made from captive balloons of the ordinary spherical design or from a car elevated in the air by a train of man-lifting kites on the system developed by the late Col. S. F. Cody. Briefly, the Parseval-Sigsfeld kite balloon may be said to combine the qualities of the ordinary spherical captive balloon

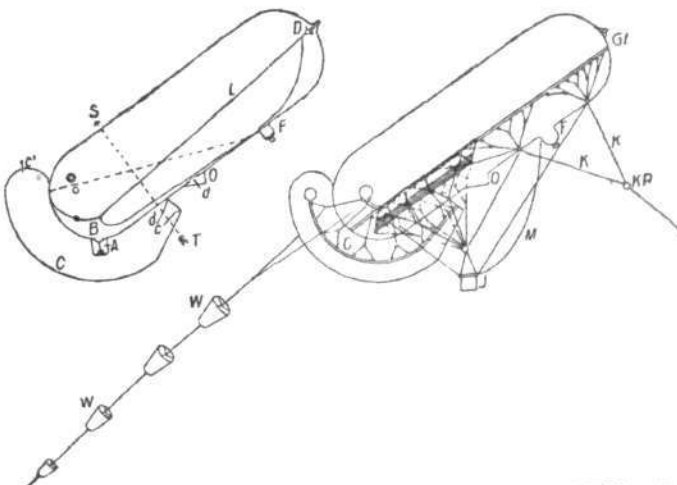


Portable gas generating plant, which has a capacity of 2,100 cu. ft. per hour.

which the upper and greater one is the gas chamber, whilst the lower smaller one forms the ballonnet or air chamber. The latter is filled with air automatically through an opening facing the wind and fitted with a flap valve.

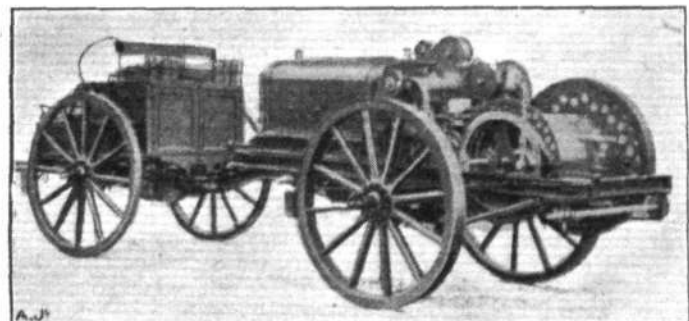
The air entering the ballonnet through this opening creates a pressure inside the ballonnet equal to that exerted on the nose of the envelope by the wind. This pressure is transmitted to the gas chamber through the horizontal wall of the ballonnet. It will thus be seen that an equilibrium is established between the outer air pressure and that inside the gas chamber. As however, the gas itself exerts a pressure on the inside of the envelope, the addition of this static gas pressure and the air pressure produces a higher pressure than that of the outside of the balloon, thereby preventing indentions, which would adversely affect the stability of the balloon.

Loss of gas is also compensated for by the ballonnet,



THE PARSEVAL-SIGSFELD KITE BALLOON.—On the left it is seen in section. *F*, opening for filling balloon; *G*, gas chamber; *B*, ballonnet; *O*, air inlet of ballonnet; *d*, flap valve; *A*, air outlet from ballonnet to rudder; *D*, gas outlet valve; *L*, inner valve cord; *M*, valve cord to basket; *C*, rudder; *W*, trailers; *KK*, anchor cable; *KR*, cable drum; *J*, basket; *c*, air inlet to rudder; *c'*, air outlet from rudder.

with those of the man-lifting kite. The advantage of this combination is that they are able to ascend in a calm, when the kite, which depends for its sustenance in the air on a relative wind, would be useless, and that in a high



Horse-drawn motor-driven winch.

which is always kept automatically filled with air, thereby maintaining a constant pressure inside the gas chamber. When the balloon rises the gas expands and by its pressure forces the ballonnet wall back towards the rear

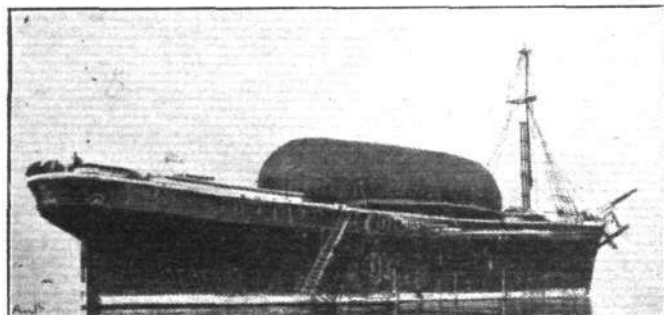
end of the balloon. As, however, the ballonnet wall is connected by a cord to a valve situated in the nose of the balloon, the movement of the ballonnet wall actuates the valve through the intermediary of the cord, and a certain amount of gas is allowed to escape until the pressure in the gas chamber has been restored to normal, when the air in the ballonnet forces the horizontal wall upwards towards the front and thereby closes the valve in the nose of the balloon.

The stability of the balloon is maintained by the three following organs: the air rudder, the cone shaped trailers suspended on a cord from the rear of the balloon, and the sails. As regards the air rudder, this consists of a long bag of circular section tapering slightly towards the front, and curving round the rear end of the balloon; it is provided with an opening in the nose through which air is admitted to the rudder. At the upper or rear end of the rudder is another smaller opening which serves as an outlet for the air. By suitably proportioning the two openings a constant pressure is maintained in the rudder, which is thus kept fully inflated under all conditions. An opening fitted with a flap valve between the rudder and the ballonnet relieves the latter of excessive air, which is allowed to escape into the rudder through the flap valve.

The action of the trailers referred to above is similar to that of the tail of a kite, and serves to damp out oscillations which would otherwise cause the observer considerable discomfort and prevent him from obtaining a clear view of the country below. The sails perform the function of relieving the rear portion of the balloon of some of the weight of the trailers, since they give a certain

amount of lift on account of the angle at which they are set in relation to the wind.

The observer's basket is slung by cords some distance below the envelope of the balloon. The number of observers carried depends naturally on the size of the balloon, which ranges from 19,000 cu. ft. to about 40,000 cu. ft., the smallest capable of carrying a single observer, while in the larger balloons three observers may be accommodated.



Filling a kite balloon on board a ship.

When in use the balloons are anchored to horse-driven motor-driven winches, of which one type is shown in one of the accompanying illustrations. Another of our photographs shows the portable gas generating plant, which produces the necessary gas for filling the balloons. This particular gas-producer, which is of the Schuckert type, has a capacity of 2,100 cu. ft. per hour, so that it could fill one of the smaller balloons in about 9 hours, whilst the larger sizes would take from 19 to 20 hours to fill.

THE BRITISH AIR SERVICES.

Royal Naval Air Service.

The following were announced by the Admiralty on the 12th inst.:

The undermentioned have been entered as Probationary Flight Sub-Lieutenants, and appointed to the "Pembroke III," additional, for Royal Naval Air Service, with seniority as mentioned: P. N. Barnes and B. Travers, November 9th; A. C. Teesdale and F. M. Ballard (for temporary service), November 10th.

The following were announced by the Admiralty on the 13th inst.:

Capt. O. Schwann graded as Wing Captain. To date Nov. 9th.

Acting Commander F. L. M. Boothby graded as Wing Commander. To date November 9th.

The undermentioned gentlemen have been entered as Probationary Flight Sub-Lieutenants for temporary service and appointed to the "Pembroke III," for Royal Naval Air Service, to date as stated: W. H. Elliott, November 7th; R. Lord, November 10th; C. B. Dalison and C. Lowthwaite Startup, November 6th.

Acting Lieut. R. Hilton Jones, R.N.R., to the "Pembroke," additional, for Eastchurch Naval Air Station, as Acting Flight Lieutenant, on probation. To date November 12th.

The following were announced by the Admiralty on the 14th inst.:

Lieut. A. P. MacKilligin, R.N.V.R., to the "Pembroke," additional, for (G) duties with aircraft. To date November 10th.

Messrs. L. F. Benyon and E. F. Moyes (additional) entered as Probationary Flight Sub-Lieutenants, and appointed to "Pembroke III," for Royal Naval Air Service. To date Nov. 12th.

The following was announced by the Admiralty on the 17th inst.:

Acting Sub-Lieut. H. J. Batchelor, transferred to Royal Naval Air Service, and entered as Probationary Flight Sub-Lieutenant and appointed to the "Pembroke III," to date November 15th.

The following were announced by the Admiralty on the 18th inst.:

Flight Lieut. J. H. Lidderdale promoted to the rank of Flight Commander, with seniority Nov. 13th, and appointed to the "President," additional, for duty as Instructor at the Central Flying School.

Flight Lieut. I. W. S. Dalrymple-Clarke re-appointed as Acting Flight Commander. To date November 13th.

Sub-Lieut. R. Cleave (R.N.V.R.) has been transferred to the "Pembroke III" for Royal Naval Air Service. To date Nov. 17th.

The following appeared in the *London Gazette* of the 17th inst.:

To be temporary Lieut.-Commander, R.N.V.R.: H. E. Perrin.

Royal Flying Corps (Military Wing).

The following appeared in a supplement to the *London Gazette* issued on the 12th inst.:

Lieut. W. A. S. Rough, 4th Batt. Bedfordshire Regt., to be a Flying Officer. Dated October 30th, 1914.

The following appeared in a supplement to the *London Gazette* issued on the 14th inst.:

The undermentioned Flying Officers to be Flight Commanders; dated November 2nd, 1914: Capt. Alexander Ross-Hume, the Cameronians (Scottish Rifles); Lieut. Amyas E. Borton, the Black Watch (Royal Highlanders), and to be temp. Captain; and Lieut. Archibald Christie, Royal Artillery, and to be temp. Captain.

The following appeared in the *London Gazette* of the 17th inst.:

The undermentioned appointments are made:

Wing Commanders—Dated November 9th, 1914: Major (temporary Lieut.-Col.) Hugh M. Trenchard, C.B., D.S.O., the Royal Scots Fusiliers, from Officer Commanding and Officer in Charge of Records, and to retain his temporary rank; Brevet-Major Charles J. Burke, the Royal Irish Regiment, from a Squadron Commander, and to be temporary Lieutenant-Colonel; and Major John F. A. Higgins, Royal Artillery, from a Squadron Commander, and to be temporary Lieutenant-Colonel.

Capt. Ian M. Bonham-Carter, the Northumberland Fusiliers, a Flying Officer, to be a Flight Commander. Dated November 2nd.

The following is substituted for the notification which appeared in the *Gazette* of November 2nd, 1914:

Capt. Arthur B. Burdett, the York and Lancaster Regiment, from a Flying Officer, to be a Flight Commander. Dated Oct. 17th.

Special Reserve of Officers.—The appointment of Mark Dawson to a Second Lieutenantcy, which appeared in the *Gazette*, August 11th, 1914, is cancelled.

The following appeared in a supplement to the *London Gazette* issued on the 18th inst.:

The undermentioned appointments are made: The undermentioned Captains, Flight Commanders, to be advanced to Squadron Commanders, and to be temporary Majors. Dated November 9th, 1914: William D. Beatty, Royal Engineers, Capt. George W. P. Dawes, Princess Charlotte of Wales's (Royal Berkshire Regiment); and Capt. Archibald C. H. MacLean, the Royal Scots (Lothian Regiment).

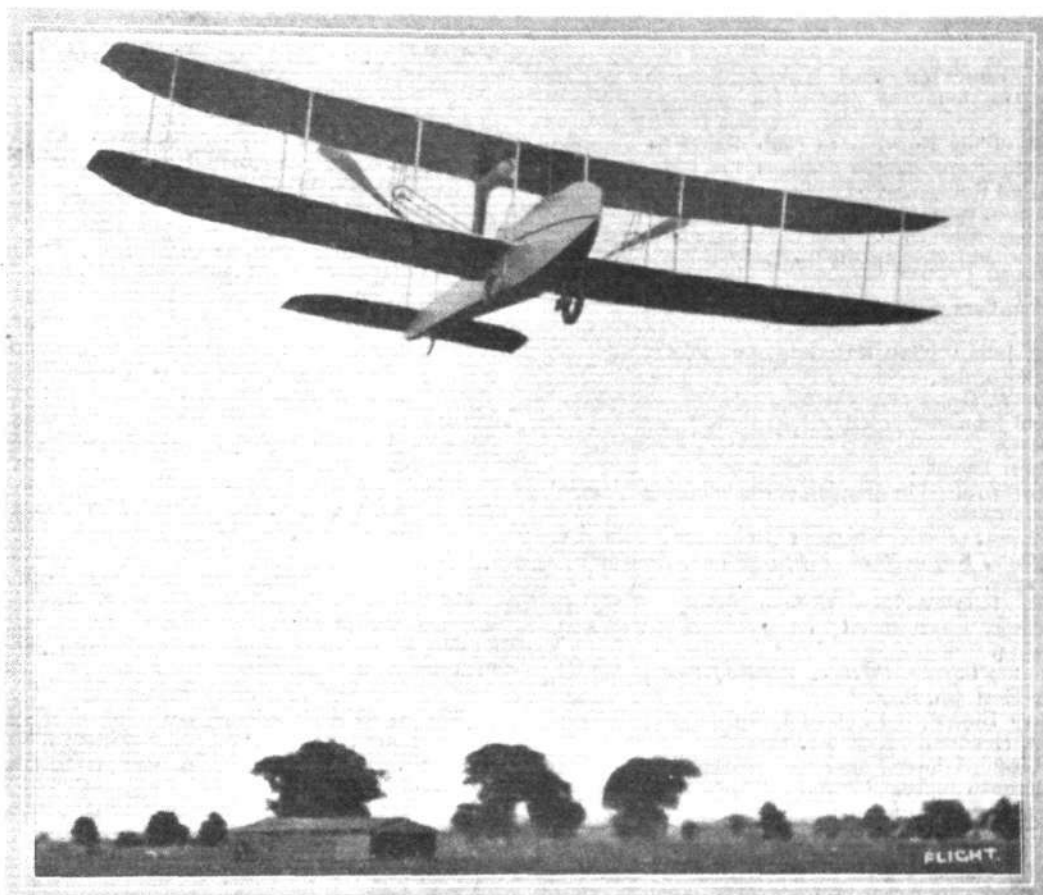
Capt. Kutter B. Martyn, the Duke of Edinburgh's (Wiltshire Regiment), a Flying Officer, to be advanced to Flight Commander. Dated November 9th, 1914.

Second Lieut. Archibald B. Ford, Special Reserve, to be a Flying Officer. Dated November 28th, 1914.

THE NEW WRIGHT BIPLANE.

ALTHOUGH changes have been made in the Wright biplanes since the first radical change of discarding the front elevator, it is remarkable how the main characteristics have been adhered to, even in the latest model that has just been turned out from the Dayton works. As will be seen from the accompanying illustration of this new Wright biplane, in spite of the fact that a distinct departure from usual Wright practice has been made, it is still the Wright biplane of old. The principal

leading edge of the planes. The latter are of the usual Wright type, set at a slight dihedral angle. The lower plane is divided into two parts and attached to the fuselage. Two propellers are mounted at the rear of the planes in the orthodox Wright style, and are driven by chains and shaft from the engine. The radiator for cooling the engine is mounted between the planes behind the pilot and passenger. A single-tail plane and elevator, similar to those on previous Wright machines, is



The new Wright biplane in flight.

alteration in the machine in question consists of the covered-in fuselage, following somewhat tractor biplane practice. This fuselage is of rectangular section tapering to a vertical knife-edge fore and aft, giving a good streamline form. Mounted in the nose is the engine, a 60 h.p. 6-cyl. water-cooled Wright, which is enclosed by a stream-lined bonnet that can readily be removed so as to give access to the engine. Pilot and passenger are seated side by side in the fuselage immediately behind the engine, and level with the

mounted on the rear extremity of the fuselage, with the vertical rudders above. A pair of running wheels are mounted immediately underneath the lower plane, one on either side of the fuselage. Here another Wright characteristic is retained, for the wheels being close to the lower plane brings the machine very close to the ground. The principal dimensions of this machine are: Span, 32 ft.; overall length, 26 ft. 5 ins.; supporting area, 350 sq. ft.; speed, 70 m.p.h.; climbing speed (two up and fuel for 4 hrs.), 400 ft. per min.

⊗ ⊗

U.S. Military Competition Postponed.

OWING to the fact that only one firm which had entered—the Curtiss—had complied with the conditions, the U.S. Government decided to postpone the competition which was to have commenced at San Diego, Cal., on October 21st.

When the competition was announced last July six or seven firms promised to take part. The military authorities have agreed to test the machines built by the Glenn Martin, Christofferson and Schmitt firms on the distinct understanding that the Government are under no obligation to purchase the machines.

⊗ ⊗

A New Burgess-Dunne for U.S. Army.

AT the end of October the Burgess Company, of Marblehead, Mass., who have secured the right to build Dunne machines in the States, completed a new biplane of this type for the U.S. Army. It is fitted with a 120-130 h.p. Canton-Unné motor, and in its initial tests, fitted with a heavy hydroplane pontoon weighing, according to the makers, over 317 lbs., a speed of 75 m.p.h. was developed, while it climbed at the rate of 300 ft. a minute. The machine is being sent to the military aerodrome at San Diego, Cal., where it will be used during the winter.

The Royal Aero Club of the United Kingdom

OFFICIAL NOTICES TO MEMBERS

SPECIAL COMMITTEE MEETING.

A SPECIAL MEETING of The Committee was held here on the 17th inst., when there were present:—Prof. A. K. Huntington, in the Chair, Mr. Griffith Brewer, Mr. Ernest C. Bucknall, Mr. J. T. C. Moore-Brabazon, Mr. C. F. Pollock, and the Assistant Secretary.

Death of The Right Hon. Earl Roberts.—On the motion of the Chairman the following Resolution was unanimously passed:—

"The Committee of the Royal Aero Club desires to place on record its deep regret at the death of Field-Marshal The Right Hon. Earl Roberts, who had been an Honorary Member of the Club since 1902, a Member of Council since 1906, and a Vice-President since 1910. The Committee further desires to tender its respectful sympathy to Lady Roberts and her family."

Election of Members.—The following New Members were elected:—

Flight Lieut. John William Kidston Allsop, R.N.A.S.
Percy Easton Cornish.
Lord Edward A. Grosvenor.
Lieut. Arnold John Miley, R.N.
John Morrissey.
Oliver Wolcott Thomas.

Aviators' Certificates.—The granting of the following Aviators' Certificates was confirmed:—

- 955 Flight Sub-Lieut. Allan Knighton Robertson, R.N.A.S. (Short Biplane, Royal Naval Flying School, Eastchurch). Nov. 5th, 1914.
- 956 Flight Lieut. John William Kidston Allsop, R.N.A.S. (Short Biplane, Royal Naval Flying School, Eastchurch). Nov. 5th, 1914.
- 957 Lionel Franklin Beynon (Wright Biplane, Beatty School, Hendon). Nov. 5th, 1914.
- 958 William Harry Ellison, R.N. (Bristol Biplane, Royal Naval Air Station, Hendon). Nov. 6th, 1914.
- 959 Flight Sub-Lieut. Aylmer Fitzwarine Bettington, R.N.A.S. (Maurice Farman Biplane, Central Flying School, Upavon). Nov. 6th, 1914.

- 960 Julian Pauncefote Inglefield (Maurice Farman Biplane, Military School, Brooklands). Nov. 7th, 1914.
- 961 Flight Sub-Lieut. John Martin d'Arcy Levy, R.N.A.S. (Maurice Farman Biplane, Central Flying School, Upavon). Sept. 23rd, 1914.
- 962 Flight Sub-Lieut. Bertrand Lawrence Huskisson, R.N.A.S. (E.A.C. Biplane, Eastbourne School, Eastbourne). Oct. 28th, 1914.
- 963 Sergt. William Sharpe, R.F.C. (Maurice Farman Biplane, Royal Flying Corps, Netheravon). Nov. 6th, 1914.
- 964 John Harold Rose (Hall Biplane, Hall School, Hendon). Nov. 7th, 1914.
- 965 Jesse Albert Easter (Grahame-White Biplane, Grahame-White School, Hendon). Nov. 7th, 1914.
- 966 Lieut. Eustace Osborne Grenfell, D.C.L.I. (Maurice Farman Biplane, Central Flying School, Upavon). Nov. 9th, 1914.
- 967 Robert William Alexander Ivermee (Caudron Biplane, British Caudron School, Hendon). Nov. 10th, 1914.

The following Aviators' Certificates were granted:—

- 968 1st Class Air Mechanic James Douglas Clarke (Avro Biplane, Central Flying School, Upavon). Oct. 28th, 1914.
- 969 Commander R. M. Groves, R.N. (Maurice Farman Biplane and Bristol Biplane, Royal Naval Air Station, Hendon). Nov. 15th, 1914.
- American Certificate.*—
- 312 Lieut. Douglas B. Netherwood, U.S. Army (Curtiss Biplane, North Island, San Diego, Cal.). Aug. 17th, 1914.

The Secretary of the Club.

Mr. Harold E. Perrin, the Secretary of the Club, who joined the Royal Naval Volunteer Reserve as a Lieutenant in September last for duty in connection with the Royal Naval Air Service, has now been promoted to Lieutenant-Commander.

New Members.

Members are reminded that according to the Rules, the Annual Subscription of any New Member they may propose, who is elected between November 1st and December 31st of this year, will cover the period up to December 31st, 1915.
166, Piccadilly, W. B. STEVENSON, Assistant Secretary.

AEROFOILS ARRANGED IN TANDEM.

THE RESULTS OF A SERIES OF EXPERIMENTS MADE AT EAST LONDON COLLEGE.

THE extent to which "interference" is present when aerofoils are placed in such a position that the wash or wake from one aerofoil exerts a disturbing influence upon the air through which the other is moving, has been the frequent subject of experiment because of its importance in connection with the stability of aeroplanes. The mutual interference of superposed surfaces, the effect of the wake from the airscrew and the wash from the main supporting surfaces over the controlling organs, or *vice versa*, afford typical examples of wake effects, which may be conveniently studied by determining the distribution of pressure over the surfaces. This method of investigation was employed in the series of wind tunnel experiments, the results of which are given herewith, that were made by Mr. Stewart, B.Sc., and Mr. P. Schar, B.A., under the direction of Dr. A. P. Thurston, of East London College, to whom we are indebted for our information.

The arrangement of the aerofoils chosen was that employed on the "canard" type of aeroplane, as at the time the experiments were commenced, the form of machine which now predominates had not become so common. The main supporting surface had a span of 11 ins., a chord of 2 ins., and a maximum camber of

$\frac{1}{16}$ in., while the corresponding dimensions of the elevator or rider aerofoil were $8\frac{3}{4}$ ins., 1 in., and $\frac{1}{16}$ in. In both cases the maximum camber occurred at a point distant one-third of the chord from the leading edges.

Throughout the experiments, the main surface was set at an angle of 7° , but the elevator, which was mounted in the course of the investigation in a number of positions relative to the main aerofoil, and of which only five are shown in the diagram in Fig. 2, was capable of being rotated, and the pressure distribution over the surfaces of both the rider and the main aerofoil was ascertained at each position for angular movements of from -30° to $+40^\circ$ of the rider.

Fig. 1 shows typical diagrams of pressure distribution over the upper and lower surfaces of the main aerofoil with the rider inclined at angles of $+40^\circ$, $+20^\circ$, 0° and -20° for the five selected positions of the rider, 1, 3, 6, 7 and 10 (see upper right-hand diagram in Fig. 2). As is to be expected, the maximum amount of interference with the pressure distribution occurs at No. 6, when the rider is in close proximity to the main surface, but the least wake effect is experienced in position No. 10.

For convenience of examination, the areas of the diagrams for each angular position of the rider and each

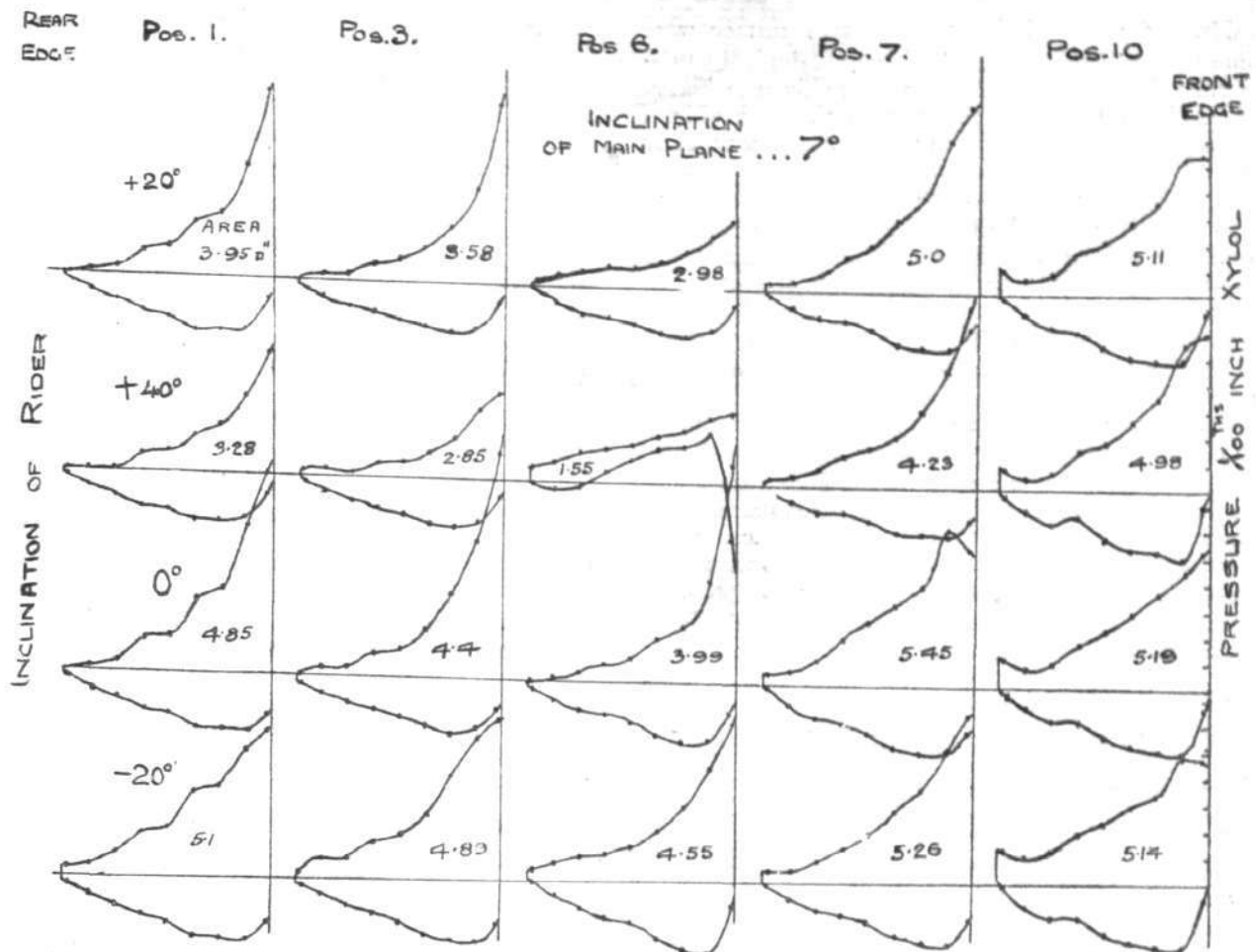
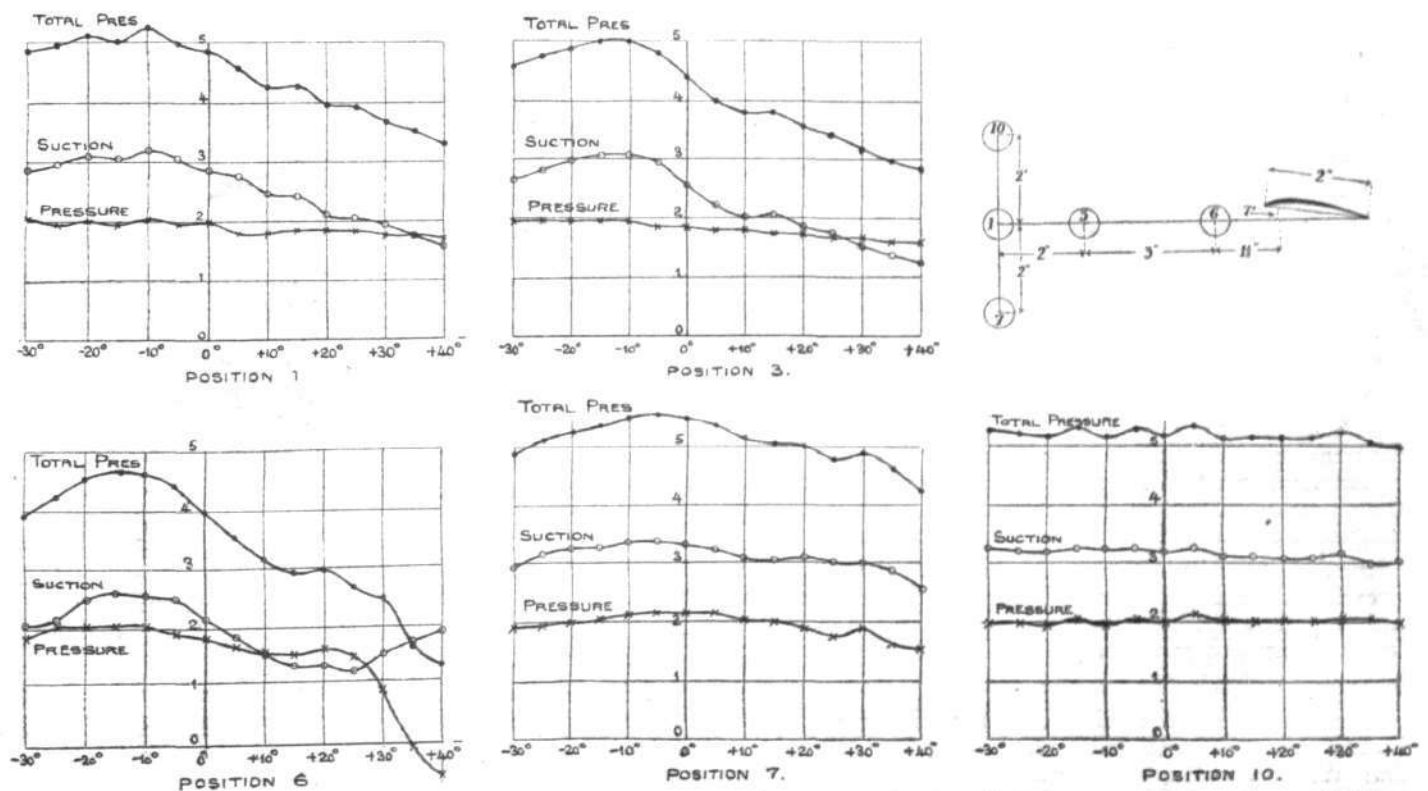


Fig. 1.—Diagrams showing the distribution of pressure over the surface of the main aerofoil with variations in the position and inclination of the elevator.



disposition of rider relative to the main surface were measured; and the results, plotted against the inclination of the rider for the five arrangements, are given in Fig. 2. It will be observed that the pressure on the underside of the main plane, with the rider in position 1, is not greatly affected by the inclination of the rider, but the suction on the upper surface decreases continuously from about -5° to $+40^{\circ}$, and that at $+35^{\circ}$ the suction and pressure are of equal amount. Similar results are observed when the rider is in position 3, the principal difference being that the effects are more marked—the pressure and suction on the lower and upper surfaces reaching the same numerical value at an angle of about $+27^{\circ}$.

With the rider in position 6, however, both curves undergo considerable change—the suction and pressure become numerically equal at $+10^{\circ}$ and at $+27^{\circ}$, and between these two angles the pressure on the lower surface is greater than the suction on the upper surface of the main aerofoil. Up to an angle of -15° and above angles of $+25^{\circ}$ the suction increases, but the pressure decreases rapidly after an angle of about $+22^{\circ}$ of the rider is attained and becomes zero at 35° , after which it

is negative. The curve of total pressure falls rapidly from an angle of inclination of -10° to the end of the range of movement, where it becomes less than that due to suction effects alone, and only about one half of the total pressure for an angle of inclination of -10° .

When the rider is in position 7, i.e., 2 ins. above position 1, the interference with the pressures on the main aerofoil is much reduced; principally, however, as regards the effect upon the suction on the upper surface, the pressure upon the lower surface being but slightly less than in position 1. With position 10 the amount of interference for all angles of the rider is practically negligible, so that where the minimum amount of interference is desired this appears to possess considerable advantages over the other positions. On the other hand, where the maximum amount of interference is desired for the purposes of stability, position 6 might prove more satisfactory, but it should be remembered that in this position the controlling torques due to the variation in the lift and the distribution of pressure on the main aerofoil with the inclination of the rider, may be much reduced because of the smaller radius at which the pressures are acting from the centre of gravity of the aeroplane.



FROM THE BRITISH FLYING GROUNDS.

Brighton-Shoreham Aerodrome.

Pashley Bros. and Hale School.—Up with instructors: J. Morrison, J. Sibley, and A. Goodwin. Circuits and eights: T. Cole, J. Woodhouse, Menelas Babiottis and C. Winchester. Machines: Pashley and Farman biplanes.

London Aerodrome, Collindale Avenue, Hendon.

Grahame-White School.—Last Saturday week, Probationary Flight Sub-Lieuts. Barnes, Bray, Cooper, Driscoll, Ffield, Hodsoll, Livock, Price, Wakeley, Watson, and Young straights with Instructors Manton, Russell, Winter and Shepherd. Probationary Flight Sub-Lieuts. Breese, Ffield and Wakeley taking instructive passenger flights. Mr. Carabajal and Mr. Easter circuits, eights, &c., and Mr. Easter afterwards passing *brevet* tests and gaining certificate in good style. Mr. Greenwood straights with Mr. Manton.

Sunday, Probationary Flight Sub-Lieuts. Barnes, Bray, Breese, Cooper, Driscoll, Ffield, Hodsoll, Livock, Price, Wakeley, Watson, and Young straights with Instructors Manton, Shepherd, Russell and Winter. Mr. Carabajal solo circuits and eights. Probationary Flight Sub-Lieut. Bray straights alone, and Probationary Flight Sub-Lieut. Ffield making solo circuits and landing practice on 110.

Monday, Probationary Flight Sub-Lieuts. Breese, Driscoll, Hodsoll, Livock, Price, and Wakeley straights with Instructors Shepherd, Russell and Winter.

Tuesday, Mr. Carabajal solo circuits, eights and landing practice. Probationary Flight Sub-Lieut. Ffield landing practice on bi-rudder. Probationary Flight Sub-Lieuts. Groves, solo straights, Barnes, Bray, Ffield, Breese, Young, Watson, straights with Instructors Manton, Winter, Shepherd and Russell, and Probationary Flight Sub-Lieut. Dallison (new pupil) taking instructive passenger flights with Instructor Russell.

Beatty School.—Pupils out receiving instruction during last week with Instructors Mr. Geo. W. Beatty and W. Roche-Kelly on "dual"-controlled 50 h.p. Gnome biplane and 40 h.p. Wright biplane: Messrs. Gardner (10), Aoyang (5), Fletcher (15), Geo. Beard (15),

Monfea (10), Le Vey (10), Anstey-Chave (5), Donald (5), Wainwright (5), B. de Meza (5), and Miller (5).



Mr. Lionel Franklin Beynon, who has recently secured his pilot's certificate at the Beatty School, Hendon.

Weather very bad during the week, so only a small amount of training was possible. The new 60 h.p. biplane will shortly be completed, and training on this will be carried on except during the very worst weather.

British Caudron School.—Monday, last week, too windy for school work.

Tuesday, Mr. Ivermee successfully passed test C of his *brevet* in an excellent style, reaching to a height of 600 ft.

Wednesday, Thursday, Friday, and Saturday, weather too bad for school work.

EDDIES.

ALTHOUGH so much has been heard of the good work done by the aviators of the Allies in the war, it is difficult as yet for those not in actual contact with the work going on to arrive at any definite conclusions as to the effect that the lessons already learned will have on future design of aeroplanes. It is no doubt different with those who have the opportunity of studying at close quarters the behaviour of the various types in use and seeing how they acquit themselves of the tasks set them. An opportunity which I had the other day of obtaining the views of one who has been out at the front since the commencement of the war, and who is in a position to speak with authority on matters aeronautical, brought to light several interesting points as they appealed to him.

One of the first topics touched upon was naturally the work of the Flying Corps, the organisation of which he described as being beyond reproach. As regards the *personnel*, both General Joffre and Field-Marshal Sir John French, as we know, have paid high tributes to its efficiency.

Regarding the *matériel* of our own as well as of the French flying corps, it is now generally realised in the field how correct the War Office were in demanding good climbing speed. In time of war a good climbing speed means a considerably increased range, since it is necessary to reach a good height before starting out on a reconnaissance flight.

The advantage of speed too has also repeatedly been proved in long reconnaissance flights against a strong wind high up. Another point which has been emphasised is that although light machines have their advantages, when it comes to rapid climbing, weight is no great objection provided one has the necessary motor power.

It further transpired that of our own machines several makes are proving their power to stand up excellently to the arduous work required, and to be particularly suitable for the work in hand, as we already know. Leaving out the B.E.'s, which appear to be the amazement of everybody out yonder, it is good to learn that it is the general opinion that the old pioneers of aviation are coming out on top—witness A. V. Roe, whose machines are among the best out there and do a job in one hour which takes a slower machine two hours to do.

For very fast work the scouts are particularly suitable, and of these the Sopwith scouts have, amongst other achievements, well proved their worth when they carried two of our service pilots to Düsseldorf and Cologne and back in safety. Among the machines used in the French flying corps two makes are specially distinguishing themselves, namely, the Morane-Saulnier new type "parasol" (which is slightly different from that exhibited at the Paris aero show), and the Voisin military biplanes which are proving exceptionally fine machines for war purposes.

Coming to the machines of the enemy, these, according to my informant, seem to do all that is asked of them, although they appear to be somewhat heavy and cumbersome, a drawback which, however, is apparently counter-balanced by their very fine engines, and the steps which have been taken to ensure reliability. On some of the

captured machines, the 120 h.p. Mercedes engines, following the practice in regard to Mercedes racing cars, have been found to be fitted with two sparking plugs to each cylinder, two magnetos, and two carburettors.

I also gather that a fruitful topic among aviators at the front is engines, and that many of the pilots think that the stationary engine is proving superior to those of the rotary type in point of reliability, although the latter has the advantage of lighter weight.

I am pleased to hear that although Mr. Prosser, has given up his school at Hendon and sold his machine, the work will be continued by Mr. F. Ruffy, whose interest in the firm only dates from the beginning of November, but who has already acquired two 'buses with which to carry on the school work. Moreover, he hopes to have another ready in the course of a very short time. One of the machines is a 60 h.p. Gnome engined Caudron, whilst the other is equipped with a 45 h.p. Anzani. The 60 h.p. machine is a two-seater fitted with dual control, and it is intended to give the pupils their preliminary training on this until they have got used to being up and have got the "feel" of the 'bus. They will then be transferred to the 45 h.p. biplane on which they will be able to indulge in solo flights and, when proficient, to go for their "tickets." In addition to the extra machine in course of construction, which will be fitted with a 60 h.p. Gnome, it is intended to build a 50 h.p. biplane which looks as if one may fairly look forward to things humming presently under Mr. Ruffy's guidance.

Their many friends at Hendon will no doubt be glad to learn that the James brothers, who got their "ticket" at the Caudron school in, if I am not mistaken, October of 1912, are returning to their old haunt, and will act as pilots to the Ruffy school. The James brothers have, it will be remembered, had a considerable experience on a machine of their own make, on which they have done quite a lot of flying in Wales, and should, therefore, be in a position to teach their pupils not only the handling of machines but also practical construction work.

A new biplane has just been finished at the Beatty school at Hendon, and is only waiting for an engine before taking the air. This is to be a 60 h.p. Wright, which is already on its way from Dayton, Ohio, and, thanks to the British Navy, is due to arrive at Liverpool to-morrow (Saturday). As the fitting of the engine only involves the work of putting on the chains and tightening up the four bolts holding it down, the new 'bus should be available for school work in the course of the next few days. Owing to its higher power, this latest addition to the Beatty fleet should prove very popular with the pupils, as it will enable them to tackle their work in much higher winds than was possible with the older lower-powered machines. Again, as the speed will, no doubt, be considerably in excess of that of the 'buses used at this school up to now, a distinct advantage will accrue to the pupils by enabling them to appreciate higher speed, a fact which will be useful when, after taking their ticket, they have to take in hand some of the greyhounds of other makes.

The Beatty engine, to which we have from time to time referred, is now rapidly nearing completion and will,

when ready, be installed in one of the Wright biplanes and given a preliminary run of a couple of hours with the machine on the ground, and then, if it is running satisfactorily, tried in the air, as Mr. Beatty contends that it is better to test an engine under actual flying conditions than on a test bench, where the conditions can only approximately imitate those obtaining in flight. Good luck to him, and may he reap the just reward due to him for his hard work and perseverance.

x x x

It seems that several of our old friends from Hendon find it difficult to stay away from there for any length of time, for besides the James brothers, who, as I have already mentioned, are returning to the aerodrome, I hear that M. Baumann, the popular Caudron and Wright pilot, who went to his native land, Switzerland, at the outbreak of war, is returning to the Beatty school, where he should get a good reception. Baumann, it appears, has been serving in the Swiss mountain artillery, but the snow has now got in its work, and has covered up all the guns. So, rather than stamp his feet on the white-aproned covering of his native mountains, he is, at least for a time, returning to his natural element for the benefit of the pupils at the Beatty school. I have heard it rumoured that the Swiss Navy is ice-bound, but have not been able to get official confirmation of this report, although the censor will probably "not object to its publication."

x x x

One of the most enthusiastic pupils at the Beatty school is Mr. E. J. Jenkinson, the 19 years old "boy scout airman," whose ambition it is to form a boy scout flying corps for members over 17. Scout Jenkinson intends obtaining the necessary funds by giving exhibition flights, and, when he has got the school going, to teach his pupils on the principle: Learn first, pay afterwards.

x x x

The many friends of Mr. Harold Blackburn, who is serving with the R.F.C., will be pleased to hear that he is well and, judging by a letter sent to his brother at Doncaster, happy. Following is an extract of his letter:—

"I came back to the camp on Friday, having been away three days getting a new machine. I did a reconnaissance yesterday

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The Lights of London.

IN reply to a question in the House of Commons on Monday, Mr. McKenna, the Home Secretary, stated that he was informed by the Metropolitan Commissioner of Police that the police returns showed no increase in the number of traffic accidents occurring by night. The regulations regarding lighting were made on the advice of the Admiralty, who were responsible for the defence of London against aerial attack. They had already been relaxed so as to allow shops to remain brightly lighted till 6 p.m., and he would be glad to relax them further as soon as the Admiralty advised him that this could safely be done.

"Aircraft in the German War."

UNDER this title Mr. H. Massac Buist has written a little book which should prove universally useful just now, in that it gives a general survey of the uses to which aircraft can be, and is being, put at the present time. In this way it should do something to make the position clear, as the general public still has the most hazy ideas as to what is and what is not possible, while the

(Sunday), also sat in a field close to a village which was suffering tremendous bombardment by the German guns.

"Occasional misdirected shells burst close to where I sat, and the shells from our own batteries behind were whistling overhead. The positions we are operating against now seem almost as difficult as those we were hammering at on the Aisne. Part of the time I sat there I watched a fight between one of our aeroplanes and one belonging to the enemy, and heard the shots distinctly. At about the same time there was a nice little concert in camp here.

"Two Taubes came over just after church parade. Our firing party turned out with rifles, our automatic guns rattled, and our



Mr. E. J. Jenkinson, "the Boy Scout Airman," who is learning to fly at the Beatty School at Hendon.

anti-aircraft got to work. The dogs barked, alarm bells rang, and there was no end of a beano. We are all considerably interested to see what kind of orders we shall get the first time a Taube comes over during church service.

"I had a few shells from the German anti-aircraft gun yesterday; but he made very rotten practice, and I came home to our chateau to a good dinner and a novel in front of a good fire. I am always nervous till we have had the first shell, then I don't mind, and positively chuckle with satisfaction when they time their fire badly and the shells burst well above us. The only time we clear out for shell fire is when flying slowly up wind. To stay under these circumstances is simply asking for it, so we don't wait."

"ÆOLUS."

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picturesque efforts of some journalists in depicting absolutely impossible feats do not tend to make things any better. As is pointed out in the preface, the book is written for to-day and not for posterity, and it will indicate the scope of the work if the headings of the six chapters into which it is divided are given. They are: 1.—The chief sorts of military aircraft; 2.—Work of the aeroplane and the seaplane in the war; 3.—Achievements of airships; 4.—The British air service; 5.—Equipment of our Allies; 6.—The German and Austrian aerial arms. It only remains to say that it is written in that very readable style with which Mr. Buist's name is associated, while the fact that the whole of the author's fees go to charity—half to the *Morning Post* Embankment Home, which is incidentally doing so much additional good work for Belgian refugees, and the other half to the Newspaper Press Fund, on which admirable charity demands will also be the heavier by reason of the war—should in itself ensure a huge sale for this admirable and very opportune addition to the literature of the war. Moreover, the price of the book, which is well bound, is only one shilling.

FIRTH'S STEEL FOR AEROPLANES.

ALTHOUGH at the present time steel forms but a small proportion of the material used in an aeroplane, as distinct from the engine, there is little doubt that in course of time it will be much more extensively employed—perhaps, as tubing in some parts and as cast metal in others; but, more probably, for most parts some form of lattice girder will be developed, owing to the extreme lightness of the latter system of construction. But notwithstanding its limited use, its selection as the material most suitable for the manufacture of certain parts has not been made haphazard and merely because its strength is high compared with its weight, although this is of importance—it is the result of the careful examination of its physical and mechanical properties; and not only so, but the particular grade of steel to be used for each component part has been determined in a similar manner.

We, therefore, see that there are certain factors which have an important bearing upon the material question. In the case of steels for aeroplanes, the facility with which it may be machined, sheared, drilled, punched, bent cold, welded or brazed is of importance; so, also, is its resistance to fatigue and shock, and its ability to withstand stresses in any direction, either in its length or transverse thereto, especially as regards the latter, with steel for brackets, sockets or lugs, and engine plates; and these are, of course, all affected to some degree by any heat treatment to which it may be subjected. In addition, where the material for hydroplanes is under consideration, a rust-proof steel is a particularly desirable quality. For motor steels, adequate strength, not necessarily high resistance in either tension or compression, because bearing surface or considerations of rigidity may enter into the matter, is essential, as is also resistance to fatigue, shock, and wear; while the ease with which the steel can be forged, machined, &c., may be of importance. Generally speaking, it may be assumed that the percentage elongation and contraction of area under mechanical tests indicate the ductility and elasticity of the material; the impact figure shows its ability to resist shock; and the hardness number represents the resistance offered to wear.

In the accompanying tables the results of mechanical tests on a few of Thos. Firth and Sons' steels for aeroplanes, &c., are given. The steels have been marketed for the express purpose of meeting the demands of aeroplane manufacturers for materials of the highest quality, and the extent to which they are now used in aeronautical work conclusively proves that they have amply satisfied that demand. The tests recorded were made on test pieces of 14 gauge thickness, in the case of sheet metal, and on bars 0.564 in. diameter and 2 ins. in length in other cases, with the exception of the case-hardened pieces. The C.N. 1, F.M.S., and N.S. 25 grades are of nickel, mild and nickel sheet steel respectively, and all offer great resistance to fatigue; but may be punched, sheared and drilled without difficulty, while they can also be bent cold without cracking, and are as strong at right-angles to the direction of rolling as in a direction parallel thereto. The first two qualities may be readily acetylene welded, but whereas with the F.M.S., which is a mild steel, the edges of the two plates may be run together under the acetylene flame and make a good weld, C.N. 1 requires the assistance of the usual welding stick of mild steel wire to make a joint. All three of the steels mentioned may be satisfactorily brazed, and hence all are specially suitable for making clips, brackets, lugs,

engine plates, &c. N.S. 25 sheet is practically non-magnetic, which property, although diminished if it is heated in any way, as in brazing, can be recovered subsequently by suitable heat treatment.

The F.A.S. and F.S.S. steels in Table I are supplied in bar form, and are intended for making turnbuckles, pins, eyebolts, and similar parts which may be highly stressed. The figures quoted for heat-treated specimens are obtained by subjecting the finished work to a suitable heat treatment, and represent limiting values, as intermediate values are obtainable by suitably varying the treatment. These steels when in the annealed state, or even after heat treatment to give the lower tensile strength quoted, may be readily machined. F.A.S. bar is the well-known rust-proof steel, concerning which we gave full particulars of tests that had been carried out in connection therewith, in *FLIGHT* for March 28th last. C.N. 5 is a nickel case-hardening steel, and the tests recorded were made on the core of a case-hardened specimen. It is intended for use in parts that require a hardened surface, yet which are subject to a fair amount of shock and vibration.

Most of these steels are expressly supplied to conform after suitable heat treatment with the R.A.F. standard specifications. Thus the F.M.S. sheet meets the No. 9 specification; the N.S. 25, the 19a specification; and the F.S.S. (nickel chrome) can be heat-treated to fulfil the requirements of the R.A.F. in Nos. 1b, 2a, 5b, and 6a specifications. It should hardly be necessary to mention that, as with any other steel which is susceptible to heat treatment, to obtain the mechanical test results given in the tables, it is necessary to subject them to a suitable heat treatment if they are heated in any way, such as for brazing, as, obviously, the temperatures reached in performing this operation must affect the structure of the metal.

In addition to the steels detailed in this table, there is another quality which at the moment has a peculiar interest—namely, the bullet-proof sheet-steel. This is supplied in thicknesses ranging between 1 and 9 mm., according to the minimum range at which it is desired to resist rifle fire or the maximum weight per square foot of armour which may be carried. Its utility for the partial or complete protection of the occupants and the more vulnerable parts of an aeroplane will be manifest, as a greater or lesser measure of immunity from danger from rifle fire is obtainable during flight, according to the thickness of plate adopted.

The results given in Table II refer to a group of steels specially suitable for automobile work. The four first mentioned are intended for the manufacture of parts subject to shock and fatigue, where great toughness and hardness are essential and where the stresses may be either alternating or torsional in character. Either the 3 per cent. nickel or the 25 per cent. nickel may be used for valves, owing to their great resistance to the corrosive action of hot exhaust gases. The latter can be drop forged, is practically non-magnetic, and, on account of its toughness, machines with difficulty; but it can be freely ground. Particulars of two of Firth's case-hardening steels, which give an extremely tough core with a hardened exterior, are given in the table, as well as the results of tests on their "50-Ton" steel. Of the other steels of this class which are manufactured, we may mention the "D.G.S." air-hardening steel, which is specially suitable for gears, owing to its freedom from distortion.

As we have already stated, the factors which determine

the suitability of a steel for use in the construction of a particular part vary to a great extent: in fact, so much is this the case that a material that is eminently adapted, after being correctly heat-treated for one part, may be entirely wrong for another if used in the same condition. No one grade of steel possesses to the maximum extent all the qualities which would be necessary in order that it may be indiscriminately used, neither is such actually desired. But while this is so, much can be done by

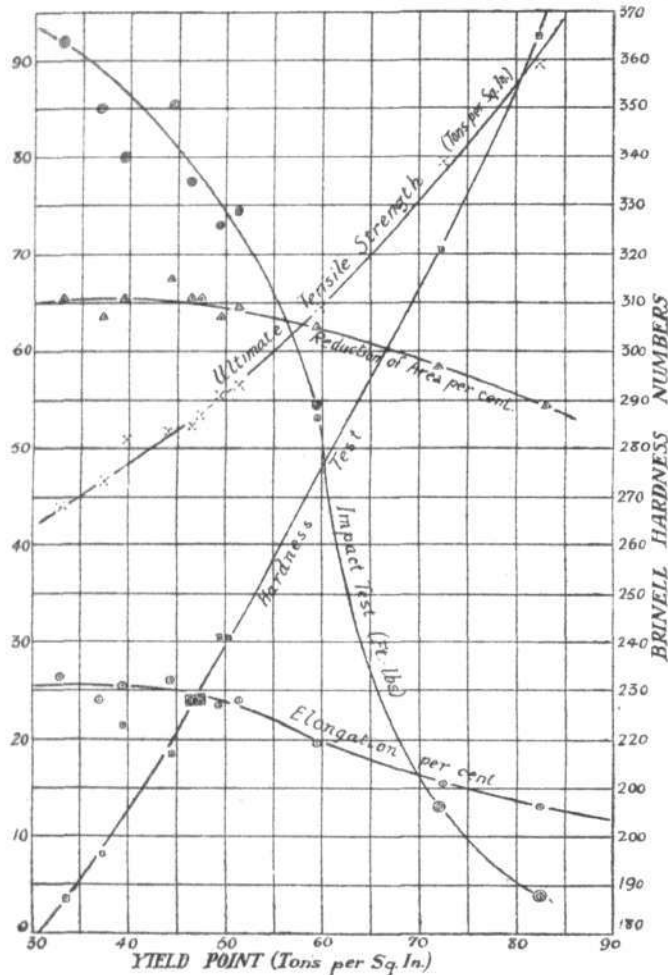


Diagram showing the effect of heat treatment upon the mechanical properties of Firth's nickel chrome steel.

subjecting the steel to suitable heat treatments, which, by bringing out the properties of a steel susceptible to them in a marked manner, render it possible to employ one kind of steel for a variety of purposes for each of which it is specially suited. This is shown by inspection of the tables, as the figures quoted as obtainable in the heat-treated condition do not represent limiting values, but are those which can be obtained from a particular heat treatment. Full information as to what this treatment is and how it can be varied will be supplied by Messrs. Firth and Sons to prospective customers.

We are able, however, in the accompanying graph, where the various mechanical properties are plotted against the yield point, to show the effect of the range of heat treatments upon Firth's nickel chrome steel. The yield point has been selected in preference to the ultimate tensile strength, as the latter is of comparatively secondary importance in considering the strength of the material to resist fracture. For example, given two steels, one of 60 tons and the other of 50 tons ultimate tensile strength, the respective yield points being 35 and 40 tons respectively, the latter would be much preferable from strength considerations alone, because a stress of 36 tons which would permanently deform the former and probably ultimately cause fracture would not injure the latter in any way. It will be seen from the diagram that where the toughness, hardness, high resistance to fatigue and shock, and a high tensile strength are all desired, as for crankshafts, this nickel chrome steel, suitably heat treated so as to give a yield point of about 60 tons per sq. in., should prove highly satisfactory.

TABLE I.—Steels for Aeroplanes.

Grade of Steel.	Form.	Condition.	Yield Point. Tons per sq. in.	Ultimate Tensile Stress. Tons per sq. in.	Elongation per cent.	Reduction of Area per cent.
C.N. 1	Sheets	Annealed ...	29	35	24	35
		Heat treated ...	35	40	26	40
F.M.S.	"	Annealed ...	18	26	30	40
N.S. 25	"	As rolled ...	36.6	52.6	20	23.3
		Heat treated ...	28	42.9	34.5	37.9
F.A.S.	Bar	Annealed ...	30	40	27	65
		Heat treated ...	45	55	22	64
		"	70	90	12	34
F.S.S.	"	Annealed ...	26	44	30	65
		Heat treated ...	49	55	23	63
		"	105	129	10.5	34
C.N. 5*	Bar	Case hardened	35	49.88	22	60

TABLE II.—Steels for Motors, &c.

Grade of Steel.	Yield Point. Tons per sq. in.	Ultimate Tensile Stress. Tons per sq. in.	Elongation on 2 in. per cent.	Reduction of Area per cent.	Impact Test. Ft.-lbs.	Brinell Hard- ness No.
Nickel chrome	35	45	24	60	80	192
Chrome vanadium	36-40	50-60	20-16	55-45	—	207-255
	75.47	78.11	15.75	47.15	26-27	340
5 per cent. nickel	32	42	26	61	82-84	179
	55.15	63.42	19	54.6	52-50	280
3 " "	31	44	26.5	56	60-65	187
	60.28	66.17	17.75	56-95	50-40	302
25 " "	15	40	51	70	—	134
Mesmeric*	—	43.57	26.5	50.95	44	—
Crucible nickel*	—	49.88	22	60	54	—
"Freedom" "50 ton"	26-32	<50	20-16	45-30	—	—

* These steels are case-hardening, and the tests recorded were made on the core of treated specimens after the removal of the outer surface.

NOTE.—Test results in italics have been obtained after oil-hardening or other heat treatment.

"News" Made in Germany.

MR. FREDERIC W. WILE, in his interesting article "Germany day by day," in the *Daily Mail*, on the 9th inst., had the following "news":—

"The *Cologne Gazette* of November 6th publishes as the latest and most important intelligence of the day an account headed:

"BOMBS THROWN ON DOVER.

"This highly exclusive information reads:

"As communications from the field inform us, a German war-

plane attached to the troops operating in Northern France (pilot, Reserve Lieutenant Caspar, of the 5th Dragoons, with Lieutenant Roos, of the 75th Infantry, as observer), flew the Channel on October 26th, and dropped two bombs north of Dover. After a 5½-hour flight the aeroplane returned safely to its base."

"Other details of the same exploit are supplied to the *Fränkische Zeitung* by an officer in the field, as follows:

"Last night we had a jolly celebration. We were guests of a flying battalion which was welcoming two of our airmen on their return from London. These officers have thrown bombs on Dover."



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THE FACTORY



Yet another "sign of the times," illustrating the present activity in the aviation world. Some views at the all-British "Novadope" works of Siebe, Gorman and Co., Ltd., London.

AIRCRAFT AND THE WAR.

The following was sent by the *Morning Post* correspondent from Paris on the 10th inst. :—

"The *Intransigent* publishes an interesting description of war-service in an airship. The airship was ordered to make its way to a certain locality in the country still held by the enemy, and to blow up a railway junction. It rose to an altitude of about 5,000 ft., and showing no lights set out towards its destination. In the darkness it managed to avoid the enemy's searchlights, and discovered the point it was ordered to attack. It descended a little in order that it might be sure of its aim, and let three bombs fall. Fire was opened upon it, and hastily it started to rise.

"At full length on the floor of the car two officers watched the effects produced by their fire. The captain, aided by a mechanic, had just placed a fourth bomb in position. Suddenly the mechanic exclaimed: 'The bomb has stuck.' It had wedged itself firmly in the tube, and it was only a matter of seconds before it would explode. The captain did not lose his presence of mind. He snatched up a hatchet, and with four vigorous blows cut away the whole bomb-tube just in time. The bomb exploded a few hundred feet below the car, and the airship was able to return uninjured to its shed."

Advices from Petrograd on the 13th inst. stated that on the previous Wednesday two German aviators, Lieuts. Merez and Poldte, during a reconnaissance in the direction of Konin, Kutno, and Plock, dropped two bombs. They, however, had to land to the west of Rypin, ten miles from the German frontier, where they were surrounded by Russian dragoons, and captured in spite of determined attempts by two German companies to rescue them. The two German lieutenants and the aeroplane, which was in good condition, were conveyed to Plock the following day.

A *Daily Telegraph* correspondent, writing from Rotterdam under date of November 11th, said :—

"A few days ago the large airship shed which was erected to the north-east of Bruges for the accommodation of two Zeppelins was taken down by Germans, and the material was placed on tramcars and conveyed to a position on the south-west of the town, where it is understood the shed will be re-erected."

Mr. Ernest Macfarren, writing on the 10th inst. to the *Daily Mail* regarding the bombardment of Arras, said :—

"A Taube aeroplane that recently appeared over the city was brought down by two French airmen, amid the applause of the few remaining inhabitants."

In another message from "Northern France," Mr. W. Beach Thomas wrote :—

"The nature of the fighting is, however, still critical, and the utter inability of aeroplanes to face the westerly gales—following the period of mist which rendered them almost equally useless—has helped the attacking force to conceal the place of its concentration. At the same time the armies have in general come nearer to one another than at any period."

The following extract is from an interesting account from a special correspondent of *The Times*, who made a tour in West Flanders :—

"Near Ramskapelle was a Blériot monoplane lying stranded halfway across a dyke, with its landing wheels buckled up and its planes ripped by bullets and splinters of shell. This was the aeroplane in which Lieut. Collett, of the Naval Flying Corps, was brought down over a fortnight ago while making a reconnaissance above the German lines. He had a lucky escape. His engine was hit by a German projectile, and he made a *vol plané* towards the Allied lines. As he came gliding down, he had to run the gauntlet of bullets from both sides, the Belgians taking him for a German. Luckily he managed to land behind their first line of trenches, where he was promptly made a prisoner. He was as promptly released when it was found who he was."

In a letter dated November 3rd Squadron Quartermaster Sergeant J. Barber of the South Irish Horse wrote :—

"The Germans are very busy with their aeroplanes, and do a lot of bomb-throwing. Unfortunately, women and children have suffered most. One of their aeroplanes passed over our lines. We did not fire at it, as it was not unlike our own and flew a Union

Jack. When it got over the town it dropped a couple of bombs and then bolted. Two children were killed and five or six wounded.

"We had satisfaction next day—we dropped two of the bomb-droppers, and the pilots and observers were killed."

The following was sent from Paris on November 13th by a *Daily Chronicle* correspondent :—

"Some French soldiers doing sentry duty on the Pont de Beaugellé at Amiens recently saw a Taube aeroplane above them, and fired upon it ineffectively. To their surprise, however, the aeroplane presently gracefully came down to the ground, and from it stepped forth Garros, the French aviator. He related that while 'chasing' Taubes a few days previously he had some trouble with his motor and descended, feigning a fall. 'A German pilot approached to take my papers, believing me dead,' said Garros, 'and when he was a few steps away I pulled out my revolver and put two bullets through him before he could say a word. Thus I secured this Taube, which is very useful for flying over the German lines. I left my own aeroplane in the care of a neighbouring farmer.'"

In an undated message received in London on the 13th inst. a Central News correspondent said :—

"Hence Dixmude is again ours, the northern section of the line is intact, and the German airman who dropped leaflets into Dunkirk on Sunday with 'Till Wednesday' on them, has proved to be as unfortunate as the Kaiser in fixing dates.

"High winds continue to prevent aerial reconnaissance, and the commanders on both sides are having anxious times endeavouring to discover fresh concentrations of troops by the enemy. They find themselves suddenly 'blind,' as it were, and with so much depending on the fight, the sensation is not pleasant."

Writing to the *Daily Mail* from Rotterdam on Saturday, Mr. James Dunn said :—

"By a daring effort British aeroplanes to-day destroyed the petrol tanks at Bruges, causing great alarm and anxiety among the Germans, whose petrol supply was already low. The movements of the staff as well as of the transport have been deranged in consequence."

Another correspondent writing from North of France gave the following incident of the fighting round Ypres :—

"It was during one of these advances that the German artillery scored. Their marksmanship for some time had been very accurate owing to the assistance they received from their aircraft. At the 56th Battery of Royal Field Artillery, belonging to the Artillery Brigade, were as usual giving a good account of themselves. Their position was excellent, and the battery of six guns was pounding the Germans, materially assisting the advance of the infantry. A Taube was observed passing overhead, and a few minutes later the German 6-in. howitzers had found the range, and shrapnel was bursting in all directions."

From Mr. F. B. Harvey, of the *Daily Chronicle*, the following was received from Amsterdam on November 14th: The Allied aviators have dropped bombs on Bruges, and have set fire to a number of petrol tanks.

Advices from Sluis state that on the 12th inst. two bombs were dropped on the German troops in Ostend; there was a heavy explosion and a benzine tank caught fire.

According to the *Vossische Zeitung*, two of the Allies' aeroplanes flew over the airship shed at Rheinau last week, and then passed over Schwetzingen, eventually disappearing in the direction of Darmstadt. Shells were fired at the aeroplanes, but they exploded above the machines.

In a despatch written to the *Daily Chronicle* from Milan, and received in London on November 15th, Mr. Austin West said :—

"Austrian aircraft have resumed their bomb-dropping on Antivari, wrecking Prince Danilo's beautiful villa, where the Crown Princess Militza is staying. It was thought that this spot would be respected, seeing that the Princess belongs to the Mecklenburg-Strelitz family, while her brother, the Grand Duke, who is now with the army of the German Crown Prince, fought with the Austro-Germans at Liège. Two bombs fell in the gardens of the villa, three others reduced to ruin a large portion of the interior of

the house, smashing the furniture, the magnificent candelabra, and a choice selection of hand-wrought mirrors. One of the Princess's maids-of-honour had an eye destroyed by flying glass."

In the German "wireless" news sent out from Berlin on the 13th inst. was the following:—

"German airmen have flown over Sheerness and Harwich in England."

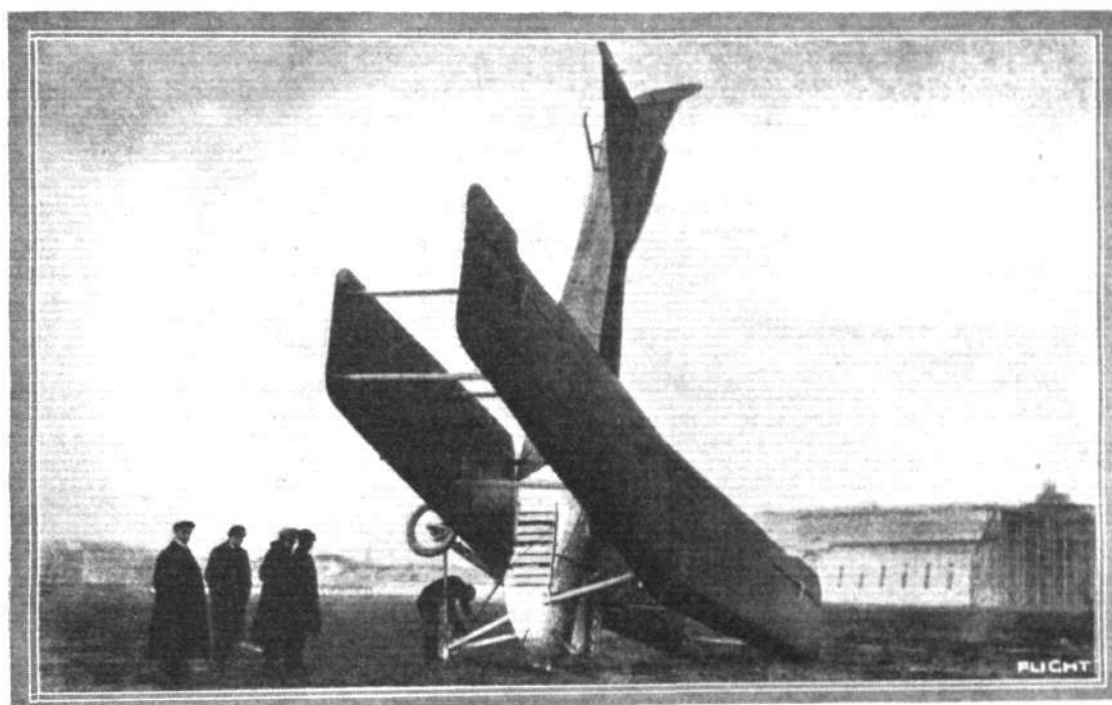
The following is from an article on "Aeroplanes in War" by Mr. T. F. Farman in *The Field* for November 14th:—

"An example of what appeared to be inevitable defeat being transformed into victory by the timely intervention of an aeroplane was furnished at Sempigny, in the department of the Oise. A detachment of French troops, composed of one regiment of infantry, one squadron of Hussars, and a section of cyclist mitrailleuses, was ordered to hold that position at all costs, but the enemy attacked it with overwhelming force, driving the French across the bridge without leaving them the time to destroy it. The Germans, regardless of the heavy losses inflicted on them by mitrailleuses while crossing that bridge, pursued the French. In an irresistible rush, Uhlans and Prussian infantry came to hand-to-hand fighting with the French in the streets of the little town, which were, so to say, being swept clear by the enemy. The main body of the foe was, however, still crossing the bridge, or still on the opposite bank of the river, when

the soft soil, but there was no sign of the aviators, who had escaped. The soldiers started a search in groups of three in the woods, and finally one of the groups discovered the aviators in hiding behind an embankment. They were challenged by the three French soldiers, who kept their rifles aimed at them, and seeing that there was no escape the two Germans threw up their hands and gave themselves up as prisoners. They were told to march along the road, and a soldier walked at the side of each, while the third followed some distance behind.

"They had hardly gone fifty yards when the German aviators, at a sign agreed upon between them, threw themselves on the two soldiers, intending to seize their rifles. One of the soldiers, named Burel, was thrown down, but he managed to prevent his assailant from seizing the rifle, which he flung out of reach. The two wrestled on the ground, and the German officer tried to make use of his revolver. But Burel seized his wrist and held his hand and head fast to the ground. Meanwhile the third soldier, who had been behind and who had abstained from firing for fear of injuring his comrade, succeeded in aiming at the officer and firing a bullet through his brain.

"During this time the other soldier, named Dubos, was struggling with the second prisoner, and was about to be stabbed by the latter who had drawn a poignard, when his two comrades came to the rescue. They killed the German at the point of the bayonet, and to make sure that he was dead they fired a bullet through his head.



A German Military (L.V.G.) biplane in a somewhat undignified attitude.

a French avion came to the rescue. From an altitude beyond the range of rifle fire its pilot took accurate aim at the bridge, which was quickly demolished by his bombs. The French then assuming the offensive, drove that portion of the enemy's force that had crossed the bridge back into the river, where a great number of them were drowned. Having received reinforcements, they threw a bridge of boats across the Oise, and, pursuing the Germans, not only regained all the ground they had lost, but also, after a sanguinary engagement, occupied Tracy le Val, which had been in the possession of the foe."

In a despatch dated November 10th, dealing with the operations in the North of France, Mr. A. Beaumont wrote to the *Daily Telegraph*:—

"The German aeroplanes—as many as are left of them, for they are diminishing every day—make it a steady practice to fly over towns some twenty miles beyond the fighting line and drop bombs to terrorise the non-combatants. A few days ago one of these appeared over the village of Arques, near Saint-Omer. There was no doubt that the German aeroplane meant to throw the customary bombs on the town. But the sentries of Arques had given warning, and the machine, which was a biplane, was fired upon and disabled. It descended in the marshy ground of the woods of Clairmarais.

"A detachment at once set out in the direction of Clairmarais, and soon discovered the aeroplane, which was deeply embedded in

Had they succeeded in their treacherous attempt the two German officers would no doubt have killed the three soldiers and attempted to escape.

"Another instance in which a German aeroplane was destroyed, but in the course of a thrilling pursuit in the air, is related by a French journalist who had been at Arras. He was with a friend in the square in front of the demolished building of the Hôtel de Ville and was contemplating the ruins when the noise of an aeroplane was heard. They looked up and saw a 'Taube,' which had, no doubt, come also to throw bombs on Arras. Some children were playing in the streets near by, and their frightened mothers hurriedly called them in. But an instant later a French biplane appeared in the sky, and as it was slower than the 'Taube' the latter started in pursuit.

"But the biplane had acted only as a decoy. Before long a fast French monoplane of the Nieuport type darted upwards and followed the German machine, which was now caught, as it were, between two pursuers. The biplane swerved round, and as it was better armed it headed for the 'Taube,' whose retreat was cut off by the Nieuport machine. The 'Taube' made a desperate effort to escape by rising at a sheer angle, but at that moment a shot from the Nieuport machine struck it, and the German monoplane fell from an enormous height to the ground, where it was smashed and the pilot was killed. The two French aeroplanes continued circling over the town for a while, and then flew back to their stations."

On Tuesday a *Morning Post* correspondent at Washington sent a summary of an account of four days spent by a correspondent of the *New Herald* at the German Headquarters in France, in which was the following:—

"In addition to the Emperor and his personal entourage Great Headquarters consisted of thirty-six chiefs or department heads, making with clerks, secretaries, and garrison, 1,200 souls.

"The correspondent says he wondered why the aviators of the Allies were not on the job. A dozen backed up by an intelligent intelligence department could so obviously settle the fortunes of war by blowing out the brains of their enemy. Perhaps, he adds, that is why the whereabouts of Great Headquarters is guarded as a jealous secret. Soldiers at the front do not know where it is, nor do the people at home, and of course no mention of it is made in the German Press. Two aeroplane guns were mounted on the hills across the river opposite the Emperor's residence, and near them is a picked squad of sharpshooters on guard day and night."

A telegram from Maastricht to the Dutch paper *Telegraaf* stated:—

A dirigible coming from Belgium yesterday (15th) flew over part of the south position of Limburg. It was observed that the balloon was badly damaged either by storm or bombardment. It passed to the south of Maastricht, and disappeared in the direction of Germany, *via* Valkenberg."

From Sittard in Dutch Limburg also came news that on the same day at noon an airship had been observed coming from the south-east and following the Dutch frontier.

A special correspondent of *The Times* writing from Dunkirk on November 13th said:—

"An officer who has examined the German guns which were left abandoned in the water near Ramskapelle tells me that they are 5-in. guns apparently of Austrian make and designed to be used against aircraft. The water round about them is five or six feet deep in most places."

An interesting account of the work of the aviators with the Allied Armies, which appeared in the *Matin* on Saturday, contained the following:—

"One by one from various points the aeroplanes return to their quarters like homing pigeons. Soon the whole squadron is there, and while pilots and observers go to headquarters to make their reports, the mechanics see to the machines. Suddenly, the sound of a motor is heard and all eyes turn to scan the sky. A black spot shows against the grey clouds. No, it is not a Prussian but a French aeroplane, and the pilot brings some very important news. A German convoy is advancing along a little branch line some thirty miles away. Immediately the air-camp is full of bustle.

"In less than a quarter of an hour the whole squadron is up and off, flying in single file. Suddenly, before the pilot has been able to make out precisely what is beneath him, a flame rises from the ground and a great wave of air rocks the machine. The bomb dropped by the leading aeroplane must have hit something. We cut off the motor and descend. The aeroplane in front of us has just made the same manoeuvre, and has dropped its bombs, to judge by the columns of thick smoke that arise here and there. It will be our turn soon.

"Still we descend. And now we can distinguish what is going on beneath. An engine is lying on its side, a great hole torn in its flank, and behind it is the black, confused mass of a convoy, from which flames and smoke are pouring. The aim has been true. A little further on, when the smoke blows momentarily aside, we see another convoy in flight. We switch on our motor, overtake it, aim, and drop our bombs. No time to watch their effect. If we have missed we must leave it to those who follow to do better. We still have work to do. In front of us lies a village, from whose houses issue little dark specks in hundreds, as from a disturbed ant-hill. We drop more bombs, and this time we are sure we have not missed. Columns of smoke rise up, the movement among the dark specks becomes more marked, and great billows of air cause our machine to roll like a boat in a high sea.

"Now the chief of the squadron signals to us to return. Regretfully, and dropping our last projectiles, we sweep round and make for home, amid a hail of ineffective bullets. Below us the convoys are burning still, throwing out yellow tongues of flame into the gathering darkness. Far away in the horizon we can see the friendly flicker of the lights that denote our landing-place. The day's work is over, a good day's work and a typical. There will be many a German battery that will wait in vain for the promised and sorely-needed munitions."

The following news was sent from Rotterdam by Mr. James Dunn to the *Daily Mail* on Monday:—

"A storm-tossed Zeppelin flying low passed near Maastricht (East Belgian frontier) yesterday afternoon. The airship was badly damaged in the rear and sailing in an almost vertical position, making erratic, jerky movements. The crew were clinging on to prevent their being thrown out. By desperate efforts they succeeded in reaching the German frontier, where the Zeppelin collapsed and became a wreck."

The *Daily Telegraph* correspondent at Rotterdam gave the following version of the incident:—

"One of Germany's airships narrowly escaped being interned in Holland on Sunday. A Maastricht message in the *Nieuwe Rotterdamsche Courant* states that a dirigible was seen in that district in great difficulties. It came so low that the trailing cable seemed to touch the ground, but the crew succeeded in getting the motors to work again, and, rising to a height of 300 metres, the airship escaped across the German border."

Mr. George Potts, an Englishman who has resided in Brussels for many years, and who stayed in Brussels during the whole period of the German occupation, has arrived in London from the Belgian capital. Speaking to a *Morning Post* representative on Tuesday, he said that a large Zeppelin shed has been erected at Berchem, on the outskirts of Brussels, and is nearly ready for use.

The following extract from French reports of the action in which the Prussian Guards were defeated, throws a sidelight on the valuable work effected by aircraft:—

"Being in some doubt as to the disposition of the German forces the British general sent a wireless message to Ypres ordering aeroplanes to leave Ypres and direct their searchlights upon the plain. The searchlights revealed the presence 250 yards south of Zonnebeke of the advancing German army. The enemy had been informed of the movement of the Allied troops and, while the latter expected them from the north, they were preparing to attack by the south, by this means hoping to create confusion in the ranks of the Allies.

"By the searchlight of one aeroplane the Prussian Guards were discovered at a distance of barely 130 yards from the British lines.

"The British general ordered the infantry to make a right about turn and the battle began."

In a message dated Belgium, November 15th, a *Morning Post* correspondent said:—

"Snow fell this morning: and snow, sleet, and rain continued, with violent winds, during the day. Air reconnaissance has almost ceased, but I noticed to-day one aeroplane in the air, a British biplane flying very low. Against the wind it did not make more than 10 miles an hour, and rocked violently. But it kept on. The British air service is more daring than any other in bad weather.

"The Naval air section did good work yesterday and to-day pounding at the Germans entrenched in houses in front of Nieuport."

A *Daily Mail* correspondent sent the following from Rome on Monday.

"The German correspondent of the Bologna newspaper *Resto del Carlino* has visited the Zeppelin building yard at Friedrichshafen. He says that at the beginning of the war Germany had thirty Zeppelins in service. Since then work has gone on night and day, 12,000 men being employed in building additions to the air fleet. On an average Friedrichshafen can turn out two airships a month, and the Germans hope to have completed by next spring a further fleet of eighteen dirigibles intended for an expedition against England. Each airship is 462 ft. long, 49 ft. in diameter, with a crew of thirty. The armament consists of a quick-firing gun and fifty bombs."

A Reuter message from Luederitz Buchi (German S.W. Africa), November 14th, *via* Cape Town, November 16th, stated:—

"Several of our camps report that they sighted a German aeroplane manoeuvring over our positions. Ten shots were fired without taking effect. The machine flew so low over one camp that the figures of the two occupants could be clearly distinguished, but they neither dropped bombs nor fired.

That there is good reason for assuming that the excessive caution of the Press Bureau in preventing the

publication of interesting news is unnecessary, is shown by the following extract from a letter signed "Ubique" which appeared in the *Times* on Tuesday :—

"Three days before my son was killed in action, I heard from him that his battery detrained at ——— marched through ——— to a position chosen for it near the trenches ; all along the 14-mile march a Prussian aeroplane followed them, dropped bombs, and eventually marked their position ! So that, although we could not know, the Prussian Staff, six days before this last letter reached me, had exactly located the unit and noted its strength, &c."

In a message from Paris, dated Paris, November 17th, Mr. H. J. Greenwall wrote to the *Daily Express* :—

"A Taube aeroplane succeeded this morning in reaching here. Before it could drop any bombs it was seen and chased by a French monoplane.

"The Taube made a great effort to escape, and an exciting chase followed. It was eventually overtaken and brought down at Beauvais."

Writing to the *Daily Mail* from Dunkirk, on Wednesday, Mr. Basil Clarke said :—

"The weather is fine again, and the airman on both sides to-day resumed operations. A German aeroplane arrived over Cassel at noon and dropped two bombs, which fell near the Town Hall. A woman and child were killed. A general of the Allies was near the Town Hall at the time, but escaped injury."



New Ranks in Air Services.

FROM the official notices of Service appointments on page 1132, it will be seen that the first officer of the Royal Naval Air Service to be promoted to the rank of Wing Captain, which was created under the reorganisation scheme of June last, is Capt. O. Schwann.

It will also be seen that the rank of Wing Commander now appears in the Royal Flying Corps (Military Wing), the first officers to be so appointed being Lieut.-Col. H. M. Trenchard, C.B., D.S.O., the Commanding Officer of the Military Wing, Major C. J. Burke and Major Higgins, the two latter being given the rank of temporary Lieut.-Colonel.

Carrier Pigeons O.H.M.S.

AN official notification has been issued to the effect that it has been decided to use carrier pigeons for certain purposes in connection with his Majesty's Services. The public are, therefore, requested to refrain from shooting or otherwise interfering with carrier pigeons whilst on passage.

The Loss of the "Hermes."

IN connection with the sinking of H.M.S. "Hermes," the following correction has been issued by the Admiralty :—

Previously reported missing but not on board when the ship was sunk :

Turner, John, C.P.O. Mechanic.

Vacancies in the Royal Naval Air Service.

RECRUITING has recommenced for the Royal Naval Air Service, and a call is made for men of the age of 18 and upwards to be trained in the handling, care, and maintenance of aircraft and motor transport and general work in connection with the Naval Air Service. Preference will be given to men who have had experience in petrol-engine work and carpentry, but this is not an essential qualification. Enlistment may be for the war only or under the usual conditions, *i.e.*, four years in the R.N.A.S. and four years in its Reserve. Application should be made in writing to the Naval Recruiting Officer, London Aerodrome, Hendon, N.W.

A Development of Air-Sickness.

SOME aviators are of course well aware of the "air-sickness" which afflicts them while flying when the

A correspondent of the *Daily Telegraph* at Rotterdam reported on Wednesday :—

"Since the Allies' aviators nearly caught the Kaiser at Thielt, the Germans have, says the *Echo Belge*, forbidden the bringing of any letters into Ghent."

In an interesting despatch regarding the attempt of the Germans to break through the French lines at Chaulnes, the *Morning Post* correspondent said :—

"It was a distinct point in favour of the French that the weather during this battle had become misty, with fog hanging up aloft for a considerable part of the day. This prevented the use of aeroplanes, and the absence of this means of correcting the range kept the big German guns in their rear from taking their usual effective part in the fray. It was an excellent object-lesson of their dependence upon their aerial scouts for their efficiency. This recent fighting has demonstrated what a wonderful aid the aeroplane is in modern warfare. When it cannot be used the lack of it is instantly observable. When the British forces were being moved from the Aisne round to the north, for quite two days before they began to march our aviators were aloft chasing anything in sight, and all through the march they policed the air to perfection. It is pretty safe to say that so far as aerial observations went the Germans knew absolutely nothing of the line of khaki that was moving along the roads to the railroad."

atmospheric conditions are "bumpy." Apparently, however, the Service aviators in France are experiencing a new form of the malady, for one of the R.F.C. officers refers to air-sickness which "does not result from mere flying, but from the high angle guns which are fired by the enemy at aeroplanes, and which cause so great a disturbance of the air that it is as much as ever you can do to control your machine. You hardly know whether you are upside down or not. It makes me downright sick, just like a bad attack of sea-sickness."

A New Aerial Bomb.

THE following details of a new bomb which, it is said, is now being used by the French air service, were sent to the *Daily Mail* by a correspondent in Paris, who stated that he had spoken with one of the pilots who had been experimenting with the new device :—

"The two (the old and the new bombs) are very similar in size and weight, but the effect as seen from above is very different.

"When the new bomb bursts it simply lays everything out flat within the area of its explosion. It seems to exert the whole of its force in waves like the ripples when a large stone is thrown into a pond. Men go down like ninepins, buildings collapse like a house of playing cards, guns are turned over as if by some unseen hand.

"The explosion raises practically no dust or smoke. Even the earth disturbed by the case of the bomb striking the ground is instantly flattened out by the same extraordinary waves of force.

"Extreme cold is produced at the moment of explosion, cold so intense that I felt it myself when I dropped my first bomb at a height of about 800 ft. I was taking great chances in flying so low, but I wished to see the effect of the bomb. It fell on a section of Germans bivouacking in a field. I estimated that at least thirty men were killed within the area of the explosion. Had they been massed more densely more would have been killed.

"Death from these bombs comes instantly from intense cold and concussion. The material composing the new bombs is simple. It can be conveyed to any air base, and the bomb can be filled by the airman or his assistant before he starts."

An American Cross-Country Record.

ON October 18th, W. C. Robinson beat by more than 100 miles the American cross-country record by flying from Des Moines, Ia., to Kentland, Ind., a distance of 370 miles, in 4 hours 44 mins. He intended to fly to Chicago, but was blown off his course. His machine was a monoplane built by the Grinnell Aeroplane Co., and fitted with a 100 h.p. Robinson 6-cyl. radial motor. The greatest height attained was 7,500 ft.

Models

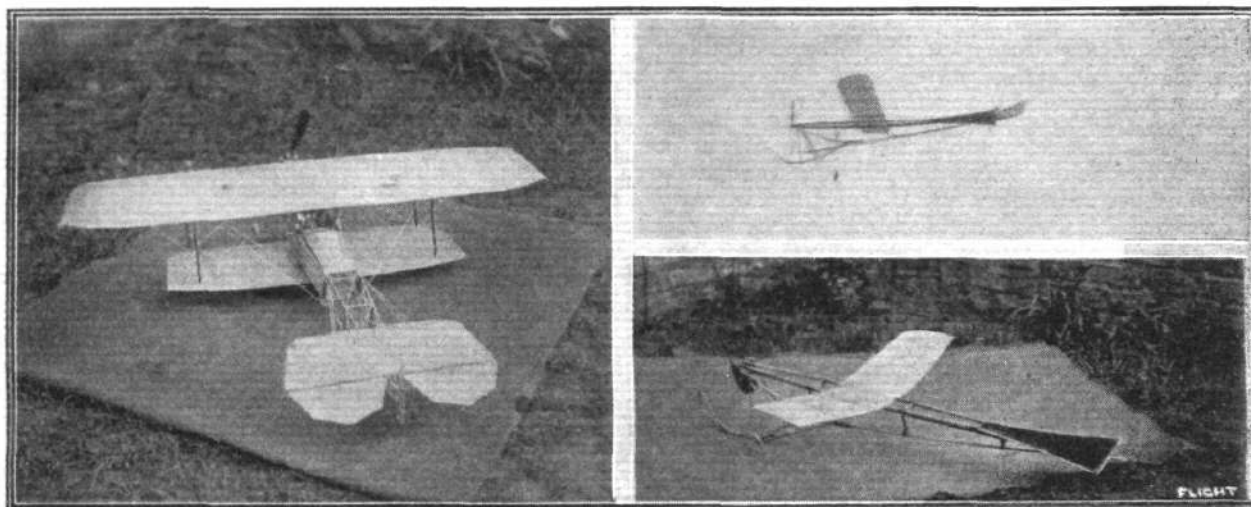
Edited by V. E. JOHNSON, M.A.

Mr. F. W. Bramley's Models.

The Canard r.o.g. machine is of the ordinary A frame type, and is 45 ins. long, and is constructed of silver spruce. The main plane is of steel wire, and has a span of 36 ins. and a chord of 6 ins. in the centre tapering towards the tips, which are upturned, and set at a slight negative angle. The elevator has a span of 12 ins., and a chord of 3 ins. The vertical fin, just over and in front of the elevator, has an area of 6 sq. ins. Carved propellers are fitted; they have a

pattern) has a diameter of 14 ins. and a pitch of 28 ins., and is driven by 22 strands of $\frac{1}{4}$ strip rubber, 11 strands to each gear. This model rises off ordinary ground in about 12 ft., and flies a distance of about 250 yards. The duration is some 40 secs., and the average height about 40 ft. The total weight is $1\frac{1}{4}$ lb. The c.g. is situated 2.5 ins. behind the leading edge of the main plane.

The Scale Model Biplane.—This model was built for exhibition purposes, and secured a first prize at a local exhibition. It has a



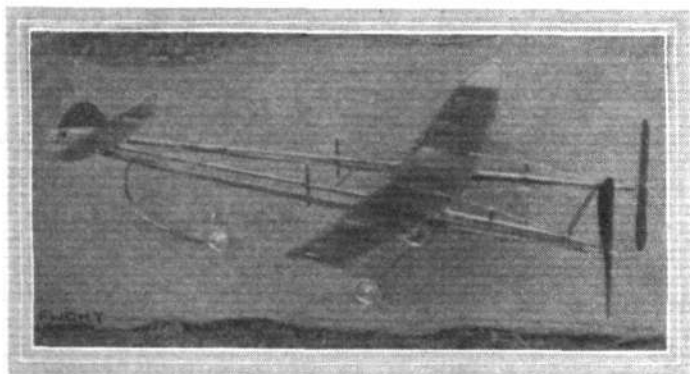
MR. F. W. BRAMLEY'S MODELS.—On the left the scale model, and on the right, below, his tractor monoplane, which is seen above in full flight.

diameter of 10 ins., and a pitch of 22 ins.; each is driven by 10 strands of $\frac{3}{16}$ strip rubber. The model rises off ordinary ground, and flies from 250 to 300 yards, showing good stability. The supporting area amounts to 200 sq. ins. The total weight is 10.5 ozs. The c.g. is situated 1.5 in. in advance of the main plane.

The Tractor Monoplane has a fuselage which is of three spar streamlined type, and is also constructed of silver spruce, and is fitted with distance pieces of lancewood. The length is 4 ft. and the maximum depth and breadth are 4.5 ins. The chassis is constructed of U-shaped steel ribbing, and is of the Morane pattern. The wheels are of aluminium, 2.75 ins. in diameter, and are rubber sprung. A bamboo skid, reinforced with steel ribbing, is fitted in the event of a bad landing. The main plane, which is constructed

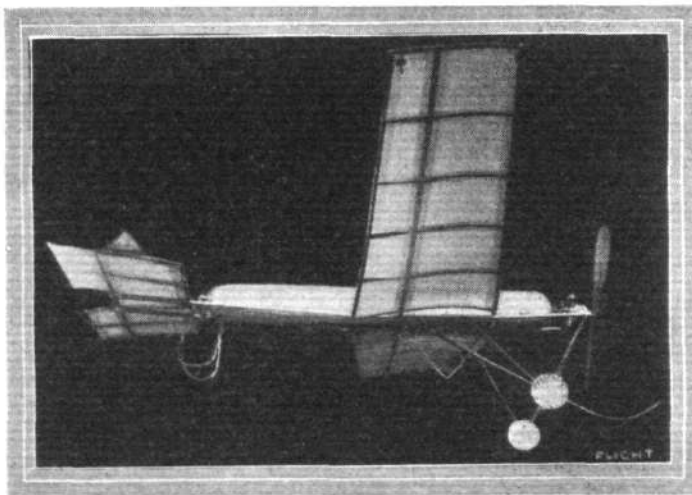
span of 3 ft. 4 ins. and a length of 2 ft. 9 ins. The diameter of the propeller is 10.5 ins. I am thinking of trying this model in actual flight, but I have not decided upon the type of motive power to employ.

I thought about fitting a light compressed-air engine; do you think any success can be obtained with this type of motor? [Undoubtedly—more especially if the machine be a lightly loaded one. We understand that a member of the Wimbledon Club, Mr.



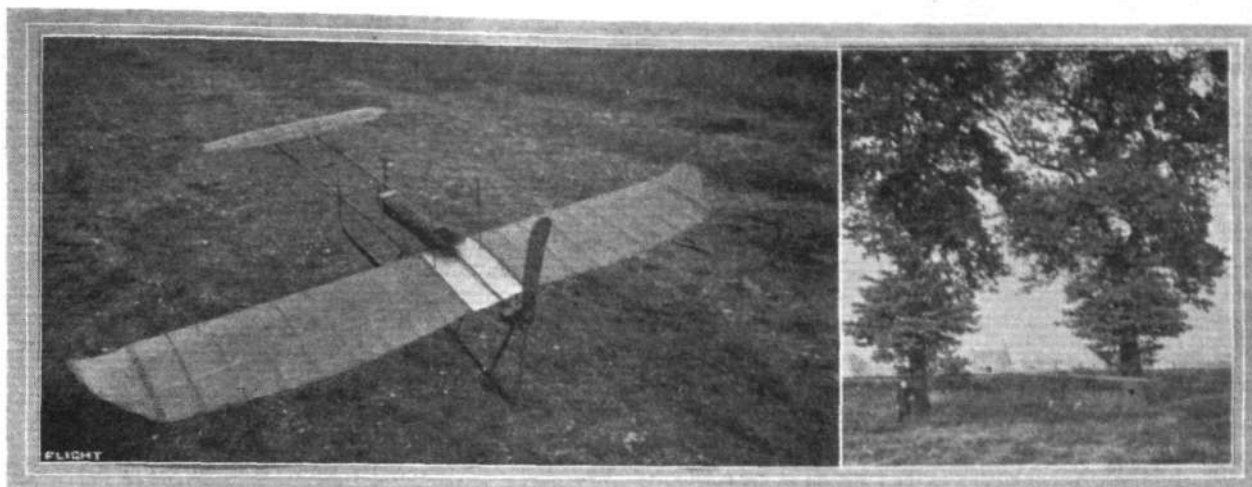
Mr. F. W. Bramley's r.o.g. monoplane model, canard type.

of hickory, has a span and chord of 4 ft. and 7.5 ins. respectively, and is covered with proved Jap silk. The tail has an area of 8.6 sq. ins. and the fin an area of 14 sq. ins. Twin gearing is used; the gears are of steel, $\frac{1}{8}$ in. in diameter, and are contained in a light steel frame. The model when first constructed had no gearing, but I found when I came to fit this on to the model that both the duration and distance were improved. The tractor screw (Chauvière



Mr. W. Jones' steam-driven Olympia model.

G. Hayden, has recently obtained a duration of no less than 74 secs. with a specially constructed machine and plant of this type. The container, which is proportionately large, is said to be so thin that air has to be kept in it in order to prevent it collapsing inwards. The engine is a two-vertical-cylinder one, with a D slide valve working across the bottom of the cylinders. Soft soldering is said to be used throughout.]



Mr. G. Harris's steam-driven monoplane.

Mr. G. Harris's Steam-Driven Monoplane.

Having been occasionally successful in launching from an overhead wire and pulley, I tried this method until I found a suitable ground to rise from. I took the machine out one evening, and after a couple of runs, both under elevated, the model rose and made a bee-line for a telegraph pole, with disastrous results to the fuselage and elevator, but fortunately the plant and propeller were quite uninjured. After a fortnight in "hospital" I tried the machine again with very gratifying results. One one occasion the model flew a distance of 580 yards after circling. Only those who have tried steam aeroplanes can picture my excitement at the conclusion of this flight. As a result of my experiments I have come to the following conclusions: Don't use ball valves to the pump, mushroom valves are best with a lift of $\frac{1}{8}$ part of an inch. Use at least 12 ft. of steel tubing for the boiler coils. My first boiler was 8 ft. in length; after fitting a new one 12 ft. in length the thrust was increased by nearly half a pound, and the extra length of tube only weighed a couple of ounces. The principal parts are:

Engine (H. H. Groves type) twin cylinder, $\frac{1}{8}$ in. bore, $\frac{1}{2}$ in. stroke.

Boiler 12 ft. of $\frac{3}{16}$ x 20 G. steel tubing, weight 10.5 ozs.

Blow Lamp. Steel tube, $\frac{3}{16}$ x 22 G., wound round a carbide carrier for a nozzle.

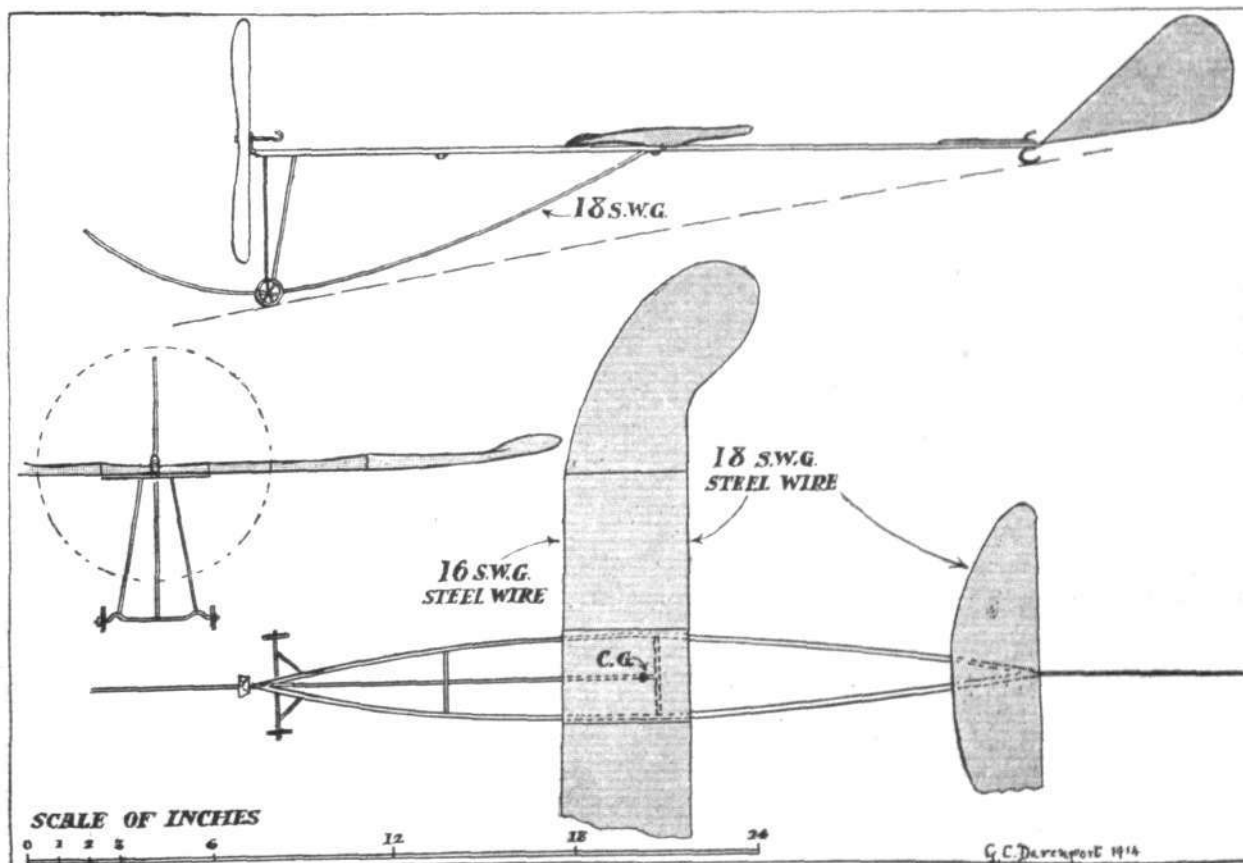
Tank $\frac{1}{8}$ in. brass.

Pump $\frac{3}{16}$ bore, stroke variable to $\frac{1}{2}$ in., fitted with two non-return valves (mushroom type) and geared down from the engine 4.5 to 1. It is efficient and reliable. In conclusion, I shall be pleased to show the model to anyone visiting the island. I am just completing a compressed-air machine, and I will send photos, in due course. I shall be pleased to send up detail drawings of any part of the machine. Aeroville, Sunnyside Avenue, Munster-on-Sea, Sheerness. [We shall be pleased to publish any drawings sent, especially of the plant.]

Single Member Fuselages.

We have received the following letter from Mr. O. Hamilton, Junr. (Hon. Sec. Stony Stratford Model Aero Club):—

"I should be much obliged if you could publish a short article on the bases for single member fuselages for twin propeller models. The twins flown by us are all of the A-frame type, and I am anxious to build a T-frame, but have a difficulty with the bases. I have built the cross member rigid, and had it smashed up, and also made



Mr. G. C. Davenport's model tractor monoplane.

the cross member of wire to connect the sides of the triangular base, and found this too flexible. Mr. H. Bond recommended the flexible to me, but up to the present I have no luck, and, apart from myself, I feel it would be interesting to others."

We must confess Mr. Hamilton's letter causes us some surprise. We have at various times constructed a considerable number of this type of model, and have not experienced this particular difficulty. We shall be glad to hear from any of our readers on the above point, and publish any drawings or sketches sent.

Mr. G. C. Davenport's Tractor Monoplane.

I enclose scale drawings of a small tractor monoplane which I hope may be of interest. The following are some of the chief dimensions, &c.:—Main plane, span, 27 ins.; chord, 4 ins.; elevator, span, 11 ins.; chord (maximum), 3 ins.; length of fuselage, 26 ins.; diameter of tractor, 8 ins.; total weight, 4½ ozs.; weight of rubber, ½ oz.; average duration, 20–30 secs.; distance, 150 yards.

The model is very stable in rough winds. I attribute this partly to the swept back wings, but chiefly to the large fin at the rear.

Wimbledon and District Model Aero Club.

Mr. T. D. Collingwood Chown, Hon. Sec. of the Wimbledon Club, writes in regard to Mr. Hamilton's criticisms last week as follows:—

"Mr. Hamilton is evidently under a misapprehension. The first six machines, my own included, referred to in my report, are driven by compressed air, not rubber, and in our experiments with compressed air models, we have found that the tractor type gives the best results. I am writing Mr. Hamilton personally on the subject.

"As regards rubber-driven single-screw canards, we have done a great deal with them in the past, and our club duration record for this type of model, which is held by Mr. Slatter with 3 mins. 30 secs., compares very favourably with the twin-screw record of 2 mins. 49 secs. held by Mr. Hayden."

Query.

A correspondent writes: What size propeller would it take to drive a model aeroplane of 10 ft. span, and how much would the machine lift without the petrol motor? Perhaps some reader would like to tackle this problem or comment on it—no further particulars are given.



KITE AND MODEL AEROPLANE ASSOCIATION.

Official Notices.

British Model Records.

Single screw, hand-launched	Duration ...	J. E. Louch	95 secs.
Twin screw, do. ...	Distance ...	R. Lucas	590 yards.
	Duration ...	T. D. Collingwood Chown	145 secs.
Single screw, rise off ground	Distance ...	W. E. Evans	290 yards.
	Duration ...	J. E. Louch	68 secs.
Twin screw, do. ...	Distance ...	L. H. Slatter	365 yards.
	Duration ...	J. E. Louch	2 mins. 49 secs.
Single-tractor screw, hand-launched	Distance ...	C. C. Dutton	266 yards.
	Duration ...	J. E. Louch	91 secs.
Do., off-ground	Distance ...	C. C. Dutton	190 yards.
	Duration ...	J. E. Louch	94 secs.
Single screw hydro., off-water	Duration ...	L. H. Slatter	35 secs.
Single-tractor, do., do.	Duration ...	C. C. Dutton	29 secs.
Twin screw, do., do.	Duration ...	S. C. Hersom	65 secs.
Engine driven off grass	Duration ...	D. Stanger	51 secs.

Compressed Air Competition.—This was abandoned owing to the unsuitable condition of the weather. Several of the models were flown, and in one or two cases they had a disastrous landing. It was agreed to hold a competition on Saturday, the 28th inst., when we hope to have a more numerous entry.

Challenge Cups.—Those who at present have challenge cups in their possession are again reminded to send these to the hon. model secretary at the earliest possible moment.

All communications regarding models to be addressed to H. A. Lyche, 46, Templemead Road, East Sheen, S.W.

AFFILIATED MODEL CLUBS DIARY.

Club reports of chief work done will be published monthly for the future. Secretaries' reports, to be included, must reach the Editor on the last Monday in each month.

Leytonstone and District Ae.C. (14, LEYTONSTONE RD., STRATFORD) WEEK-END flying as usual, Wanstead Flats, 10 o'clock, Sunday. Meet at clubroom.

Paddington and Districts (77, SWINDERBY ROAD, WEMBLEY).

Nov. 21ST, usual flying at Sudbury, 2.30 p.m.

Sheffield Ae.C. (41, CONISTON ROAD, ABBEYDALE, SHEFFIELD).

Nov. 28TH, 3 p.m., the "Colver Cup" competition. Machines judged on marking system for design, construction, lateral and longitudinal stability, directional control. No marks will be given under 10 secs. duration, and all the printed rules governing the cup, except rules 5, 6 and 7, will still be in force. Competitors to be at the judges' flag between 2.45 and 3 p.m. at Standhouse Aerodrome, Intake. Should weather be unsuitable the competition will take place on the following Saturday, same time and place.

A Chance for Talent.

AN opportunity offers for some brainy men desirous of entering the aeronautical business, especially those who are competent as senior and junior draughtsmen. We receive regularly so many applications from various sources seeking information as to the direction in which there is an opening to enter the aviation world, that we draw attention in this connection to a short announcement, which appears in our advertisement columns this week, addressed to Box 447, inviting applications for draughtsmen. To the many who have in the past communicated to us we commend this from our own knowledge as a very exceptional opening. *Verb. sap.*

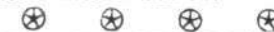
Aeroplane Work Wanted.

MESSRS. HURLIN AND CO., LTD, inform us that they are prepared to undertake any class of aeroplane work either for the trade or privately. We understand that they have facilities for the repetition of parts and such work as lathe work, turning and fitting, the manufacture of small or large iron work, engine girders, wood work, or anything appertaining to aeroplane construction. Enquiries should be sent to 295, Mare Street, Hackney, N.E.



PUBLICATION RECEIVED.

The Wellcome Photographic Exposure Record and Diary, 1915. London: Burroughes Wellcome and Co.



IMPORTS AND EXPORTS, 1913-1914.

AEROPLANES, airships, balloons, and parts thereof (not shown separately before 1910). For 1910 and 1911 figures, see FLIGHT, January 25th, 1912, and for 1912 and 1913, see FLIGHT for January 17th, 1914:—

	Imports.		Exports.		Re-Exportation.	
	1913.	1914.	1913.	1914.	1913.	1914.
January ...	12,097	5,945	4,005	210	1,510	879
February ...	17,361	28,132	3,447	106	690	441
March ...	20,425	27,731	1,924	1,934	1,042	1,440
April ...	15,593	11,384	5,524	1,175	1,413	1,473
May ...	31,241	17,062	3,726	4,059	830	9,484
June ...	14,905	15,967	1,408	5,082	1,106	142
July ...	14,469	15,548	3,812	4,994	1,250	1,695
August ...	17,993	52,448	2,805	630	510	910
September ...	19,409	4,859	6,263	—	1,470	—
October ...	21,041	39,287	3,674	325	2,163	—
	204,534	218,363	36,588	18,515	11,984	16,464



Aeronautical Patents Published.

Applied for in 1915.

Published November 19th, 1914.

23,320 H. E. S. HOLT. Aerial illuminating devices for use with aircraft.

Applied for in 1914.

Published November 19th, 1914.

2,080. W. B. MCCARLEY. Aerial propellers.

15,367. J. E. MCWORTER AND C. H. DODGE. Flying machines.

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